CURRENT HOUSING RESEARCH

Social, Economic and Technical Research

Volume 16
Number 1
Summer 2009

Canada

CMHC SCHL
HOME TO CANADIANS

CMHC—HOME TO CANADIANS

Canada Mortgage and Housing Corporation (CMHC) has been Canada's national housing agency for more than 60 years.

Together with other housing stakeholders, we help ensure that Canada maintains one of the best housing systems in the world. We are committed to helping Canadians access a wide choice of quality, affordable homes, while making vibrant, healthy communities and cities a reality across the country.

For more information, visit our website at **www.cmhc.ca**

You can also reach us by phone at 1-800-668-2642 or by fax at 1-800-245-9274.

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Issued also in French under the title: ***Recherches courantes sur l'habitation***

Publié aussi en français sous le titre: ***Recherches courantes sur l'habitation***

INTRODUCTION

Under Part IX of the National Housing Act, the Government of Canada provides funds to Canada Mortgage and Housing Corporation to conduct research into the social, economic and technical aspects of housing and related fields.

Current Housing Research is compiled and produced two times a year by the Canadian Housing Information Centre. This publication provides information and access to research which is undertaken and sponsored by the Corporation. It is also available on CMHC's web site at http://www.cmhc-schl.gc.ca/en/corp/li/horetore/horetore_004.cfm

The publication contains information on completed research reports, new publications, videos and bibliographies, as well as planned and ongoing research projects. An alphabetical title index of items listed is included at the end for quick reference.

The overall arrangement of "*Current Housing Research*" is by broad subject category. Within each subject category, lists of planned and ongoing projects and completed research reports are described.

Each entry can contain the following elements:

- The project or report title;
- A description of the project or report results;
- The CMHC Project Officer who is managing the project;
- The Division within CMHC which is responsible for the project;
- For External Research Projects, the grant recipient undertaking the research;
- A Contract Identification Number (CIDN);

- The Status of the project: whether the project is in a planned, ongoing or completed phase. "Planned Projects" are those that are not yet underway, but are likely to be initiated in the current year. "Ongoing Projects" refer to research projects which are currently underway. No reports are yet available. Once the project is completed, and a report is available for distribution, it will be listed as a "Completed Report."

- Whether the report resulting from the research project is available and the address where the completed report can be obtained.

To discuss research projects that are recent or ongoing, please call CMHC General Inquiries at (613) 748-2000 and ask for the CMHC Project Officer identified under each project description.

ACQUIRING THE PUBLICATIONS AND REPORTS CITED AS COMPLETED

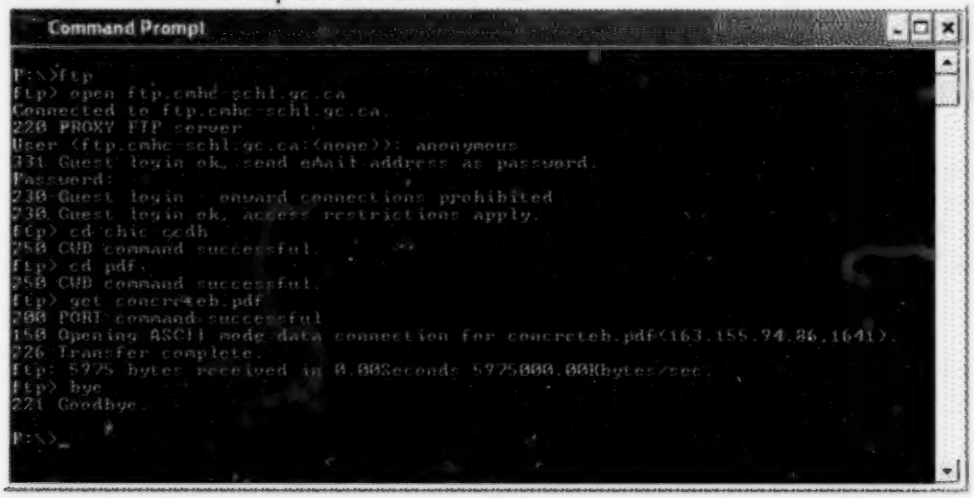
The availability section of each completed entry indicates the contact to obtain the item and whether the item can also be found on the Internet. Most items are available from the Canadian Housing Information Centre and can be ordered by using the information on the order form on the next page. We accept orders by regular mail, fax, phone, and via the Internet.

A number of the items cited are available electronically and the URL is included in the listing. CMHC uses an FTP (File Transfer Protocol) server to distribute reports. FTP has been used on the Internet as a means of transferring files between servers and users for many years and it continues to enjoy very wide use today.

In order to access a file using FTP, software with FTP capabilities is required and there are 3 types of FTP software:

1. Command Line FTP - FTP commands can be entered from a Command line or "DOS Prompt" on all Windows PCs.
2. FTP Client - a purpose built application to connect to FTP servers. These are widely available as commercial products or as shareware or even freeware on the Internet.
3. Some (not all) web browsers - Internet Explorer and Netscape can be used to access FTP files. They use correct protocol when ftp:// is entered in the address bar of the browser. Example: **ftp:**//ftp.cmhc-schl.gc.ca/

Here is an example of using the command line to retrieve a file from FTP.
FTP commands and help are available on PCs



CURRENT HOUSING RESEARCH ORDER FORM

If you wish to receive any of the completed reports or research highlights listed, or if you would like to be on the mailing list to receive *Current Housing Research*, please fill out this form and send it to:

Canadian Housing Information Centre
Canada Mortgage and Housing Corporation
700 Montreal Road
Ottawa ON K1A 0P7
Fax (613) 748-4069
Telephone 1-800-668-2642
Email: chic@cmhc-schl.gc.ca

COMPLETED REPORTS REQUESTED

☐ Send copies of above reports, research highlights

☐ Add my name to your mailing list to receive *Current Housing Research*

Name		
Mailing Address (please include e-mail)		
City	Province	PostalCode

CMHC S EXTERNAL RESEARCH PROGRAM

The objective of the CMHC External Research Program (ERP) is to encourage and enable researchers in the private and non-profit sectors to put forward and carry out relevant, innovative, and high quality housing research projects. Under the Program, financial contributions are made annually to support research investigations into important questions, problems, and issues affecting Canadian housing. CMHC is interested in receiving applications on topics related to existing CMHC housing research.

Applicants to the External Research Program must be Canadian citizens or have permanent resident status in Canada.

Independent researchers as well as those employed in Canadian universities, institutions, private consulting firms, the professions and the housing industry may apply for these grants.

Full-time students at the graduate or under-graduate level are not eligible to apply. Students may be hired to assist in conducting the research, but under no circumstances may they take over responsibility for the direction of the work or the quality of the final report.

Individuals who are full-time federal, provincial or municipal government employees may apply. However, to be eligible, an applicant must apply as a private consultant, and the proposed research must not be part of, or interfere with his/her regular work. CMHC employees are not eligible to receive grants under this Program.

To obtain the Guidelines and Application Form (product #62964):

- visit our Web site at http://www.cmhc-schl.gc.ca;
- e-mail: erp@cmhc-schl.gc.ca; or
- call 1 800 668-2642.

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TECHNICAL RESEARCH

BASEMENT WALL INSULATION RETROFIT MONITORING

There have been field observations and research findings in the last several years which suggest that polyethylene as a vapour barrier in many wall assemblies may be overkill, and that other vapour retarder systems may be preferable. The last CMHC research showed that the below-grade portion of interior insulated basement wall assemblies might benefit from more permeability, not less. Various interior insulated assemblies have been suggested as alternatives. This project will measure the moisture performance of different basement interior insulation wall assemblies in 10 real houses to see if the research findings can be substantiated in the field, and to look out for unexpected repercussions in changing the current wall construction practice. Five Saskatchewan basements have been retrofitted and are being monitored. The contractor is looking for another five basements to retrofit in a more moderate climate. This research is ongoing.

CMHC Project Officer : *Don Fugler* CIDN : 36970200
Division : Policy and Research Division STATUS : Ongoing
AVAILABILITY : Product is not yet available

FROST PROTECTED FOUNDATION MONITORING PERFORMANCE FOR RESIDENTIAL USES IN NORTHERN QUÉBEC, CHISASIBI PILOT PROJECT

This external research project consisted of installing sensors to monitor the performance of a frost protected shallow foundation in a harsh northern Quebec climate setting. The temperature sensors installed at various depths below the house slab functioned properly, and the data was collected for more than a year. The house was designed to have a radiant floor heating system; however, the system is not operational. The radiant floor heating system was tested during the construction period, but when the occupants moved in, problems encountered couldn't be resolved in a timely fashion--due to the remote area and lack of knowledgeable technicians locally to service that type of heating system. Electric baseboard heaters were then installed as an alternate heating system, and it continues to be the heating system in service. Nonetheless, the heat loss temperature profiles below the slab-on-grade foundation have been collected and preliminary analysis indicated that the slab-on-grade system installed performed adequately to prevent slab movement due to frost. The temperature profiles will be analyzed further, and reported in the project Research Highlight. This research is ongoing.

CMHC Project Officer : *Ken Ruest* ***CIDN*** : 28920210
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

RETROFITTING CRAWL SPACES - FIRST NATIONS DEMONSTRATION

The project will involve the retrofitting of several wet crawl spaces. The retrofits will be well-documented (e.g. video) and monitored for a period afterwards to verify effectiveness. The case studies will be used to demonstrate how to fix poorly performing crawl spaces. One demonstration may show inexpensive ways to lift existing houses and retrofit a better crawl space or basement underneath. Other possibilities include crawl space floor regrading, the use of exhaust fans to isolate problem crawl spaces, external utility buildings instead of basements, etc. The project has been prepared in conjunction with First Nations housing authorities and responds to a pressing problem found on many reserves. The crawl space retrofits are to take place in the summer of 2009, followed by a year of monitoring.

CMHC Project Officer : *Don Fugler* ***CIDN*** : 33050200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

BUILDING CODES

SUPPORT FOR THE DEVELOPMENT OF A NEW CSA STANDARD ON FANS AND MOTORS

The Canadian Standards Association has formed a technical subcommittee on the performance of motor/fan combinations. To ensure that the subcommittee membership includes individuals with residential expertise, CMHC retained the services of a consultant to attend the CSA meetings and provide guidance on residential fan motor efficiency to the standards committee.

CMHC Project Officer : *Don Fugler*
Division : Policy and Research Division
AVAILABILITY : Product is not yet available

CIDN : 37730200
STATUS : Ongoing

BUILDING MATERIALS

COMPRESSED EARTHBLOCK (CEB) - STRAWBALE HYBRID BUILDING SYSTEM

This project will investigate the performance of straw bale insulation in combination with compressed earth blocks, as a hybrid building system. Earth blocks are found in many other parts of the world, but their use in Canadian buildings, so far, has been limited. The researcher will be monitoring energy use as well as some of the performance characteristics of the earth blocks. The project has been initiated. The earthblocks have been cast and construction has been proceeding slowly. Because of the wet summer in 2008, 5% cement was added to the mixture for stabilization. Samples of the earthblocks will be tested at Queen's University for compression and bending, and the results compared to other CMHC earth block tests (Dupuy) and more standard construction material such as bricks and concrete masonry. The energy usage of the structure will be recorded through the winter to determine the envelope efficiency of the hybrid structure. Both moisture performance and the extent of crackage will also be monitored for the year following construction.

CMHC Project Officer : *Don Fugler*
Division : External Research Program
AVAILABILITY : Product is not yet available

CIDN : 36260216
STATUS : Ongoing

ENVIRONMENTAL CHAMBER TESTING OF EMISSIONS FROM NON-CCA TREATED WOOD: FINAL REPORT

The main wood preservative used in the recent past in Canada for residential applications is chromated copper arsenate (CCA). The United States has phased out the use of CCA-treated lumber for residential uses as of January 1, 2004 because of its arsenic content and related negative publicity over the possible health risks as arsenic is a known human carcinogen.

Wood preservatives are broadly classified as either water-based or oil type, depending on the chemical composition of the preservatives and the carrier used during the treating process. This project focussed on volatile organic emissions testing of wood samples using the new and old wood preservatives. Eight treated samples and one untreated sample were tested. The SRC environmental chamber testing facility was used to conduct the emissions testing. The ASTM Standard D5516-90 "Standard Guide for Small Scale Environmental Chamber Determination of Organic Emissions From Indoor/Material/Products" was used.

Emission factors varied from 366 mg/m2.hour to 0.03 mg/m2.hour for the nine specimens.

Prepared by Jerry Makohon, Robert Dumont, Wo Yuen, Saskatchewan Research Council, Manufacturing/Value-Added Processing Division. Ottawa: Canada Mortgage and Housing Corporation, 2005. 101 pages (2490 KB) (External Research Program Report)

STATUS : New Completed Report

AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Environmental_Chamber(w).pdf

TEMPERATURE AND MOISTURE CONDITION OF WOOD STRUCTURAL MEMBERS EMBEDDED IN INTERIOR INSULATED SOLID MASONRY WALLS, MONITORING OF THE GROSH BUILDING, STRATFORD, ONTARIO

Two projects were launched to monitor the temperature and moisture content of wood structural members (joists) embedded in interior insulated solid masonry walls. Houses with solid masonry walls in Kincardine, Ontario, and Woisely, Saskatchewan that were retrofitted with interior insulation were fitted with the necessary instrumentation to monitor the moisture and temperature regimes in wood joists embedded in the masonry walls. Based on the limited monitoring conducted in the two houses, the long-term durability of the wooden members does not appear to be adversely affected by the installation of the interior insulation systems. However, there was one exception. In the Kincardine House, joist ends embedded in the stone foundation wall experienced ever increasing moisture content after the installation of the interior insulation (spray applied poly urethane foam). It was suspected that moisture wicking up the foundation wall became trapped and this raised the moisture content of the monitored wood joist end. When the insulation was removed from around the joist, the joist began to dry. This finding supports the general observation that interior insulation retrofits of solid masonry structures should only be considered if moisture issues are first addressed.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 24290200

Division : Policy and Research Division ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

UPDATING CMHC'S "BUILDING MATERIALS FOR THE ENVIRONMENTALLY HYPERSENSITIVE"

This project revised CMHC's publication "Building Materials for the Environmentally Hypersensitive". The revision added new information about products listed in the original publication, deleted products that are no longer available and added new products. Results from emissions testing of materials are also being added along with notes on green features.

CMHC Project Officer : *Regina De La Campa* ***CIDN*** : 36360200

Division : Policy and Research Division ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

See also: CHARACTERIZATION OF THREE TYPES OF CLAY TO FACILITATE THE DEVELOPMENT OF CLAY-BASED ENVIRONMENTALLY FRIENDLY PRODUCTS, p. 39

CONSUMER INFORMATION

CREATION OF CONTENT FOR "ABOUT YOUR APARTMENT" FACT SHEETS

This project builds on the success of CMHC's About Your House series by providing consumer level information for the residents of multi-unit residential buildings. Key topics ranging from resolving indoor air quality, water penetration, occupant comfort, saving energy and water, through to security and safety are being covered. Much of the material is being developed from existing CMHC research and publications. The information will be organized into fact sheets that consumers and property owner-managers can use to solve problems in their buildings. The first 10 publications have been completed.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 31660200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

DOORS AND WINDOWS

BEST PRACTICE GUIDE - WINDOWS

In partnership with Natural Resources Canada and the Homeowner Protection Office (British Columbia), CMHC developed this comprehensive and practical technical advisory document for architects, engineers, builders, renovators, window manufacturers, window installers and others involved in the design, specification, construction, installation and interfacing of windows within the exterior wall assembly in both low-rise and high-rise residential construction. This document provides guidance in selecting the appropriate window performance criteria for the intended application and provides installation details to ensure the performance criteria is achieved through the effective continuity of thermal, air, vapour and moisture barriers at the interface between the window units and the wall assembly. The Best Practice Guide will be available by the fall of 2009.

CMHC Project Officer : *Silvio Plescia* ***CIDN*** : 30870200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

EVALUATING THE EFFECTIVENESS OF WALL-WINDOW INTERFACE DETAILS TO MANAGE RAINWATER

Based on the need for effective window-wall interface details to manage water intrusion, CMHC is developing a Best Practices Guide for Window Installation that will be applicable to both low-rise wood frame construction and high-rise buildings. To support the development of the Guide, and the needs of the fenestration, wall cladding and flashing industry, CMHC in partnership with the National Research Council (NRC), formed a consortium of interested North American organizations to evaluate specific window-wall interface details to determine how effective the details are in managing rainwater. CMHC and NRC funded the first phase of this multi-year study. The Phase 1 testing program, highlighting wall-window interface details of interest to CMHC, was completed in the fall of 2008; the Phase 1 final report is available upon request from the Canadian Housing Information Centre (CHIC) as well as the National Research Council. Phase 2 of the testing program which highlights wall-window interface details of interest to industry has been completed; the National Research Council will release the final Phase 2 report by the end of 2009.

CMHC Project Officer : *Silvio Plescia* ***CIDN*** : 27080200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is available

EXTERIOR WINDOW SHADING DEVICES FOR THE CANADIAN CLIMATE

This project will identify exterior window shading devices that can improve comfort and reduce household energy consumption in the Canadian climate. Existing technologies will be assessed for performance, durability, ease of integration with building envelope element and user friendliness. The influence of freezing rain, wet snow, or melting/freezing snow on performance and operation will be assessed. Energy savings potential will be modelled to project savings potential for different Canadian climatic conditions, including the North.

CMHC Project Officer : *Ken Ruest* — ***CIDN*** : 38300200
Division : Policy and Research Division — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available — ***NEW***

SELECTION OF LOW-E COATED GLASS FOR OLDER RESIDENTIAL HIGH-RISE APARTMENT BUILDINGS IN CANADA

Recent research at the Canadian Centre for Housing Technology (CCHT) and the National Research Council Canada (NRCC) revealed that high-solar heat gain low-e coated glass is the most appropriate spectrally selective glass for houses in Canada. However, no similar research has been conducted for older high-rise residential apartment buildings even though they represent a significant proportion of the housing stock. Thus, a complementary research study has been initiated to determine whether high or low solar heat gain glazing in apartment dwellings would be more appropriate for retrofitting into older multi-unit residential buildings to balance the need to control heat losses while encouraging solar gains to help offset space heating loads.

CMHC Project Officer : *Woytek Kujawski* — ***CIDN*** : 38840217
Division : External Research Program — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available — ***NEW***

THERMAL PERFORMANCE OF WINDOW ASSEMBLIES

CMHC in collaboration with the National Research Council, is undertaking a study to investigate the risk of condensation at the window frame perimeter of the interface assembly as a function of both temperature differential and air leakage rate across the assembly. Depending on the types of windows used and the cladding into which the windows are installed there arise different methods to provide drainage that may also affect air leakage through the assembly. This, in turn, may give rise to the formation of condensation along the window, at the sill or along the window sash and glazing panels. Various window installations, including position of the window unit within the wall assembly and different window-wall interface insulating strategies will be subjected to temperature, air pressure differentials and various air leakage rates and paths to investigate the risk to condensation they impose on the window-wall assembly. The project commenced in the summer of 2008. The testing program is expected to be completed by December 2009.

CMHC Project Officer : *Silvio Plescia* — ***CIDN*** : 33180200
Division : Policy and Research Division — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

AIR LEAKAGE CONTROL DEMONSTRATION PROJECT IN MULTI-UNIT RESIDENTIAL BUILDINGS

This research project will assess the individual and collective impact of air sealing measures on building envelope air leakage characteristics, building energy consumption, indoor air quality and occupant comfort in multi-unit residential buildings. Air sealing products and measures will be documented for common air leakage points. The predictive capabilities of existing air leakage models will be assessed by comparing their estimates of annual energy savings with that actually achieved in practice. Currently one air leakage control project is underway. Two other projects have since been discontinued at the request of the property management due to other repair/maintenance and capital replacement priorities. The remaining project is in Saskatoon, Saskatchewan and the air leakage control work has been completed. The assessment of the costs is underway and the impact of the air leakage control measures on energy consumption will be estimated based on energy metering over the next year.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 30410200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

ASSESSMENT OF RENEWAL OPPORTUNITIES FOR MULTI-UNIT RESIDENTIAL BUILDINGS

Canadian cities, in particular Toronto, have an extensive inventory of post-war high-rise housing. These multi-unit residential buildings (MURBS) have envelopes and services that are nearing the end of their useful lives. Owners of these buildings will soon have to make decisions for renewal and this implies they will require assistance from designers and building science specialists. This research will provide a comprehensive review of MURB typologies and the development of integrated over-cladding solutions along with associated cost benefit studies that enable improvements in energy efficiency.

CMHC Project Officer : *Mark Salerno* ***CIDN*** : 38330201
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

CHARACTERIZATION OF ENERGY AND WATER END-USE LOAD PROFILES IN HOUSING: LITERATURE REVIEW

CMHC, in cooperation with Natural Resources Canada, conducted a literature review of energy and water end-use load profiles, interior heat gain, monitoring and analysis methodologies in residential buildings. The project identified what data is available on energy and water end uses, research projects, data, monitoring protocols and published information relating to energy and water load profiles of housing. The study concluded that consistent, accurate and detailed load profiling data is not available for all end-uses in dwellings, particularly multi-unit residential buildings.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 22010200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

CMHC ENERGY EFFICIENCY CASE STUDIES MOLE HILL COMMUNITY GROUND SOURCE HEAT PUMP CONVERSION PROJECT

A project has been initiated to document, as an energy efficiency case study, the conversion of the dwellings of the Mole Hill Community to ground source heat pump systems. The project will describe the situation that led to the decision for the conversion, the design, installation and commissioning, and the post installation performance of the systems. The annual energy use of the project, after the conversion and any resultant cost savings will also be identified.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 18990200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

DESIGN SURVEY OF LOW ENVIRONMENTAL IMPACT HOUSING

This research project provided a documentation of the best existing examples of low environmental impact housing forms (including net zero energy) to date in Canada and internationally in similar climates. The goal was to eventually establish criteria and specifications for zero environmental impact housing in Canada, develop best practice models towards achieving this goal, and ultimately demonstrate these "deep green" housing models for Canadian climatic regions. Case studies of this series will be shown on the CMHC web site in the fall 2009 and a Research Highlight on the final report will be published by the end of 2009.

CMHC Project Officer : *Woytek Kujawski* ***CIDN*** : 25400200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

DEVELOPMENT OF AN ENERGY MANAGEMENT PILOT PROGRAM FOR SOCIAL HOUSING IN ONTARIO

CMHC is participating in the development of an Energy Management Program and pilot project for social housing. CMHC will be working with the Social Housing Services Corporation of Ontario to develop an Energy Management Program that will provide local social housing providers with the tools needed to evaluate and implement energy and water efficiency measures in their buildings. CMHC support will be used to develop or adopt tools for the Energy Management Program including utility tracking and on-line energy/water audit facilities, standard energy audits, and communication documents for property owners, managers and residents. CMHC will also participate in the evaluation of energy and water efficiency projects in 20 buildings selected to participate in a pilot project to evaluate the costs and benefits of the Energy Management Program. CMHC support will be useful to establish the Program in Ontario and will also provide other provinces with useful information on the development of central energy programs for their social housing stock as well.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 29820200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

DOCUMENTATION OF AN ENERGY MANAGEMENT PLAN FOR SOCIAL HOUSING

CMHC is preparing a report to describe an Energy Management Plan developed for Social Housing Providers. The report will document the organizational structure, processes, tools, documents, financing strategies, reporting, and quality assurance of the program. The final report will be delivered to all provincial and territorial housing agencies so that they may become informed of the Ontario program and to provide them with the opportunity to engage the plan, or any of its individual components, within their own jurisdictions.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 36070200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

ENERGY AND WATER EFFICIENCY RETROFITS FOR MULTI-UNIT RESIDENTIAL BUILDINGS

This project will update the CMHC publication that provides building owners and managers of residential multi-unit residential buildings with information on cost-effective energy and water efficiency retrofits to reduce consumption, operating costs and environmental impact of their buildings.

CMHC Project Officer : *Remi Charron* ***CIDN*** : 38370200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available ***NEW***

ENERGY EFFICIENCY CASE STUDIES OF MULTI-UNIT RESIDENTIAL BUILDINGS

CMHC is in the process of documenting the application of energy efficiency measures in both new and existing multi-unit residential buildings to be used as case studies. A compendium of case studies will be made available from CMHC. The case studies will also support the Energy Efficiency Opportunities Manual for Multi-Unit Residential Buildings that CMHC has developed. The case studies completed include: 1. Conservation Co-op, Ottawa; 2. Energy Efficiency Retrofit of the Broadview Apartment Building, Toronto; 3. Almon Street CBIP Building; and 4. Apartment Building Retrofit, Bay Street, Toronto. Ongoing projects include: 1. Performance of an Apartment Building equipped with a Water Loop Heat Pump System; 2. Grandin Green CBIP Building; and 3. Energy and Thermal Performance of an ICF Apartment Building.

The case studies will be published as a part of the CMHC Better Building Series starting July 2005 and will be issued periodically as they are completed.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 18990200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is available on the web

EVALUATING THE EFFECT OF ENERGY-RELATED BUILDING ENVELOPE RETROFIT STRATEGIES FOR HOUSING ON THE WETTING AND DRYING POTENTIAL OF THE WALL ASSEMBLY

This joint research project by NRC-IRC, NRCan and CMHC assesses the impact of two common exterior insulation retrofit strategies on the hygrothermal performance of the retrofitted wall assemblies, compared with the performance of a conventional 2 x 6 stud wall. The project uses full-scale wall testing in actual climate conditions as well as computer modelling. This work assesses the risks associated with interstitial condensation due to the insulation retrofits. The project is underway.

CMHC Project Officer : *Barry Craig* — ***CIDN*** : 37660200
Division : Policy and Research Division — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

EVALUATION OF THE IMPACT OF ENERGY EFFICIENCY AND SUSTAINABLE DEVELOPMENT MEASURES ON AFFORDABLE HOUSING

This External Research Program study will analyze the impact of including energy efficiency and sustainable development (treatment of grey water, "green materials") measures on the operation of community housing buildings. The analysis will deal with actual energy costs vs. projected costs, the costs of maintenance service and the effects on maintenance practices.

CMHC Project Officer : *Woytek Kujawski* — ***CIDN*** : 36260210
Division : External Research Program — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available — ***NEW***

FACTOR 9 HOME : A NEW PRAIRIE APPROACH: MONITORING FINAL REPORT

The Factor 9 Home: A New Prairie Approach is a report of a demonstration project of a single family residence located in Regina, Saskatchewan, that features very high levels of energy efficiency and environmental performance. The home was completed in April 2007.

Energy and water savings targets were established for the Factor 9 Home. The Factor 9 Home was targeted to use a factor of nine times less energy per square metre of floor area than the average existing home in Saskatchewan (circa 1970). The resulting energy target is 30 kWh/m2 per year(108 megajoules/m2-year) of total purchased energy consumption.

Over the one year monitoring period from June 1, 2007 to May 31, 2008 the measured consumption was 33.1 kWh/m2, which is about 10% higher than the energy target of 30 kWh/m2. For comparison purposes, a monitored group of 1970 to 1973 homes in Regina had a measured annual consumption of 331 kWh/m2 or 10 times as much energy use per unit floor area. Two additional energy conservation measures are recommended for the house: RSI 1.8 insulation should be added to the wood truss basement floor, and additional insulation should be added to the thermal storage tank for the active solar heating system. With these measures, the annual energy consumption for the house is projected to meet the 30 kWh/m2 target.

Another numerical performance target for the home is a Factor 2 reduction in purchased water consumption from the utility compared with conventional homes. The house was also able to meet the water target.

For a family of four persons, the average water consumption in Canada is 501 cubic metres per year. For the one year monitoring period, the measured water consumption of the home was 171 cubic metres, a reduction in purchased water use of 66%. In the monitored year, the total precipitation was less than half of the long-term average of 388 mm for Regina, reducing the amount of water able to be gathered by the roof collection system. The exterior landscaping for the home was not completed during the one year of monitoring.

The major technical approaches used to develop the Factor 9 Home were Integrated Design and Value Engineering.

Prepared by Rob Dumont, Building Performance, Alternative Energy and Manufacturing Division, Saskatchewan Research Council. This project was managed by John Gusdorf of Natural Resources Canada, with funding from NRCan, CMHC, and others. CMHC Project Officer: Don Fugler. Ottawa: Canada Mortgage and Housing Corporation, 2008. v, 54 pages (4.33 MB)

Note: No. 09-107 in the Research Highlights Technical Series summarizes the results of this research and is available on the CMHC web site (Order number 66569)

STATUS : New Completed Report and Research Highlight

AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Factor_9_(w).pdf

MODIFIED AIR CIRCULATION AND VENTILATION PRACTICE TO ACHIEVE ENERGY SAVINGS AND FUEL SWITCHING

This project was based on recent studies at the Canadian Centre for Housing Technology (CCHT) that demonstrated the effects of energy efficient furnace fan motors on both electricity and natural gas use. Electronically commutated motors (ECM) were shown to reduce the kWh required in moving air constantly by ~75%. This resulted in a reduction in total house electricity consumption during the heating season by ~ 25%. In other parts of the year there is a similar reduction in kWh required for constant movement of air, and a further reduction in the electricity required for cooling by ~10%. At the same time natural gas use for heating is increased by ~14% in order to maintain a proper energy balance owing to missing motor heat. The net effect is still a significant reduction in utility bills (electricity and natural gas), and there will also be a significant net reduction in greenhouse gas (GHG) emissions if the kWh are produced from fossil fuels, particularly coal.

Prepared by J. Gusdorf; C. Simpson; M. Swinton; T. Forrest; F. Szadkowski; T.J. Hwang. NRCC-47712. Ottawa: Canadian Centre for Housing Technology, 2005. xii, 60 pages (1.7 MB)

STATUS : New Completed Report

AVAILABILITY : Canadian Centre for Housing Technology

PERFORMANCE ANALYSIS OF RESIDENTIAL HOT WATER EFFICIENCY DEVICES

This project will look at the energy savings (if any) that come from replacing conventional residential water heaters with tankless (or instantaneous) appliances. The project will assess domestic hot water energy consumption before and after the retrofits of tankless gas-fired water heaters in 50 houses so that savings can be compared. CMHC will be engaging the support of several utilities that will be able to identify candidate houses and provide other support to the project.

CMHC Project Officer : *Don Fugler*

Division : Policy and Research Division

AVAILABILITY : Product is not yet available

CIDN : 38410200

STATUS : Ongoing

NEW

REGULATORY AND ORGANIZATIONAL REQUIREMENTS FOR PRIVATE DISTRICT ENERGY SYSTEMS

A research project is underway to assess the regulatory and organizational requirements of non-public utilities that provide service to multi-unit residential buildings. The project will identify issues regarding utility ownership and operation that must be addressed, governing regulations, and potential ownership-client arrangements. The project will provide guidance to private firms, housing providers, developers and condominium corporations that may be considering the generation of heat and power for sale to individual apartments or entire buildings within a community. This project is a part of a larger program of work being conducted in cooperation with Natural Resources Canada to assess the opportunities for ground source heat pumps in district energy systems. Ownership and regulatory issues represent a challenge to those other than established public utilities who would like to provide energy services, from ground sources, renewables as well as conventional technologies, to individual or clusters of multi-unit residential buildings.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 32960200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

STUDY OF ENERGY CONSERVATION OPPORTUNITIES IN THE RETROFIT OF BUILDING ENVELOPES IN LARGE MULTI-UNIT HIGH-RISE RESIDENTIAL BUILDINGS

Many buildings in the Lower Mainland of British Columbia have undergone comprehensive rehabilitation to remedy moisture-related problems. Little or no attention was specifically directed at energy conservation or greenhouse gas emissions. CMHC, the Homeowner Protection Office, City of Vancouver, BC Hydro and Terasen Gas provided funding for this research project to review and assess the effects of building enclosure improvements on the space conditioning energy use in typical high-rise residential buildings in the Lower Mainland of BC and then to develop better strategies that take into account enclosure repairs, energy conservation and greenhouse gas emissions. This project includes the collection of basic building enclosure information and energy (gas and electricity) consumption data for some 39 midrise and high-rise buildings in the lower BC mainland, an analysis of the buildings' energy performance and, where buildings have been rehabilitated, to assess the effects those repairs have had on the buildings space conditioning energy use. The project is expected to be completed by mid-summer of 2009.

CMHC Project Officer : *Silvio Plescia* ***CIDN*** : 38330200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SUPPORT FOR CANADIAN NATIONAL WEATHERIZATION CONFERENCE

This project supports the Canadian Weatherization Conference planned for October 28 and 29 in Toronto, Ontario. The conference will provide the home energy retrofitting industry with useful, up-to-date information on how to safely save energy in existing houses. CMHC will provide funding to organize the conference's operational framework and program. Natural Resources Canada has also contributed funds to this project. The technical program is under development and a conference organizer has been retained to further develop the conference, attract other sponsors and stakeholders and undertake conference planning.

CMHC Project Officer : *Don Fugler* ***CIDN*** : 38360200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available ***NEW***

ENERGY CONSERVATION

SUPPORT FOR IEA ANNEX 39: HIGH PERFORMANCE THERMAL INSULATION SYSTEMS

The International Energy Agency (IEA) has launched an R&D program to research high performance thermal insulation systems for buildings. The project will focus on vacuum insulation panels that can achieve, in theory, an insulating value of R75 per inch. Vacuum panels represent an order of magnitude improvement over conventional insulating materials, thus the energy saving potential for both new and existing buildings is enormous. CMHC has provided financial support for this IEA project, led by NRC's Institute for Research in Construction. The work under this project focused on two principal tasks; firstly, to develop a fully functional research facility (guarded hot-box equipment) for the development and performance assessment of vacuum insulation panels (VIP's) and secondly, to research and develop new alternative core materials necessary to produce lower-cost (yet high thermal performance) vacuum insulation panels The project was completed in the spring of 2009. Project report is available from CHIC and from the National Research Council.

CMHC Project Officer : *Silvio Plescia*
Division : Policy and Research Division
AVAILABILITY : Product is available

CIDN : 30450200
STATUS : Ongoing

See also: SUSTAINABLE BUILDING ENVELOPE RETROFITS FOR EXISTING HOUSES, p. 42

FIRES & FIRE PREVENTION

FEASIBILITY STUDY AND DEVELOPMENT OF PROTOTYPE CAF SYSTEM FOR FIRE PROTECTION OF HOUSING UNITS IN REMOTE AREAS: DEMONSTRATION TEST

Automatic fire sprinklers that use large quantities of water to suppress fires are often unsuitable in remote and northern communities, when the water supply is scarce. This project modified existing compressed air foam (CAF) sprinkler technology developed by the National Research Council of Canada for institutional and commercial use, for single- and multi-family housing. CMHC was interested in investigating whether CAF technology would be an effective alternative to conventional sprinklers for the fire protection of housing units in remote areas.

In the first phase of the project, a study was carried out to determine the cost effectiveness of a self-contained CAF system for a multi-unit residential building, and estimation of the capital cost of the CAF system. Some preliminary fire testing with typical residential fire scenarios was also carried out to determine the effectiveness of the CAF system in providing fire protection for residential applications. Results of the first phase of the project can be found in NRC Client Report # B-4164.1 (see Appendix).

In the second phase of the project, a prototype CAF system was installed in an abandoned house in a remote area for a fire suppression demonstration test. NRC conducted a fire suppression test with the prototype CAF system on-site with a realistic fire scenario typically found in a residential house.

This report describes the test set-up, fire scenario, the CAF system and instrumentation, and provides the results of the demonstration fire suppression tests.

Prepared by A.K. Kim, George Crampton, and Bruce Taber, National Research Council Canada, Institute for Research in Construction. CMHC Project Officer: Barry Craig. Ottawa: Canada Mortgage and Housing Corporation, 2008. 81 pages (9243 KB)

STATUS : New Completed Report

AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Feasibility_CAF(W).pdf

SMOKE MOVEMENT TESTS IN A DWELLING UNIT WITH A SECONDARY SUITE

The Institute for Research in Construction, National Research Council Canada (NRC-IRC) undertook this project in 2007, on behalf of Canada Mortgage and Housing Corporation, to investigate smoke movement in a residential building with a secondary suite located in the basement. Seven full-scale experiments were conducted in a house provided by the City of Red Deer, Alberta. An area in the basement of the house was set up to represent a room in a secondary suite. The fire tests measured smoke movement to the main floor of the house as well as to a common entryway serving both the main and the secondary suite. A particular focus of the tests was the potential for smoke transport by an HVAC system that served both the primary and secondary suites.

Prepared by E. Gibbs, B. C. Taber, and G. D. Lougheed, Fire Research Program, Institute for Research in Construction, National Research Council Canada. CMHC Project Officer: Barry Craig. Ottawa: Canada Mortgage and Housing Corporation, 2008. 75 pages (1.78 MB)

STATUS : New Completed Report

AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/CHIC_Smoke(w)_march12.pdf

SPECIAL INTEREST GROUP ON FIRE PERFORMANCE OF HOUSES

In recent years, Canadian fire death statistics have followed a downward trend. As technological advances introduce new construction practices, building designs and materials into new house construction, the fire protection community needs evidence that safety isn't compromised. The Canadian Commission on Building and Fire Codes (CCBFC) and the Canadian Commission on Construction Materials Evaluation (CCCME) requested information regarding the potential impact of such changes on the fire safety of low-rise housing. In response, NRC's Institute for Research in Construction (IRC), in partnership with CMHC, government, industry, and codes and standards agencies, has undertaken a project to research fires in single-family dwellings and the factors affecting fire safety. The primary objective of this research is to determine the impact of innovative residential construction products and systems on fire safety. A final report should be available in 2009.

CMHC Project Officer : *Barry Craig*

Division : Policy and Research Division

AVAILABILITY : Product is not yet available

CIDN : 33100200

STATUS : Ongoing

LATEST DEVELOPMENTS IN GREEN ROOFS IN QUEBEC

This is a summary of the latest developments in green roofs in Quebec, serving to outline the very latest generation of technologies that are starting to prove themselves in the southern Quebec climate. In addition, this summary shows the link between green roofs (and greening in general) and the health and well-being of human beings in urban environments. The summary ends with fact sheets on 10 recent green roof projects in Quebec. These fact sheets include information on costs, technical and regulatory barriers encountered, and available solutions that were or could be incorporated into the projects, as well as scientific results and plant survival.

Author: Antoine Trottier. Collaborators: Cynthia Philippe, Odette Béliveau and Owen Rose; Comité Verdis-Toit, Groupe de recherche d'intérêt public, l'UQAM (GRIP-UQAM); Montreal Urban Ecology Centre. CMHC Project Officer: Duncan Hill. Ottawa: Canada Mortgage and Housing Corporation, 2008. 42 pages (2.93 MB)

Nota : Disponible aussi en français sous le titre : Derniers développements en matière de toitures vertes au Québec

This document was drawn from a broader study on green roofs entitled "Toitures végétales : Implantation de toits verts en milieu institutionnel – Étude de cas : UQÀM", a case study on the implementation of green roofs in institutional environments, published in April 2008 by the Verdis-toit committee of the Groupe de recherche d'intérêt public (GRIP), the public interest research group, of the Université du Québec à Montréal (UQÀM) and the Montréal Urban Ecology Centre (MUEC). The report is available at the:

Montréal Urban Ecology Centre
3516, avenue du Parc
Montréal, Quebec H2X 2H7
Telephone: 514-282-8378
E-mail: info@ecologieurbaine.net
Website: www.ecologieurbaine.net

STATUS : New Completed Report

AVAILABILITY : For the summary: Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_bilingual/CHIC_latest_Green(w)_may19.pdf

CHARACTERIZATION OF AIR LEAKAGE, PRESSURE REGIMES AND RESULTANT AIR MOVEMENT IN HIGH-RISE RESIDENTIAL BUILDINGS

The objective of this project was to undertake a field investigation of the ventilation and infiltration in a residential high-rise building. CMHC, in cooperation with the Institute for Research in Construction, monitored indoor-outdoor air pressure regimes in a high-rise for a period of one year. Ventilation system performance was also assessed. Pressure regime measurements, in conjunction with measured air leakage characteristics of selected assemblies, are used to estimate real-time air movement across the building envelope. This information will add to the body of knowledge governing infiltration-ventilation regimes and resultant heat load calculations in buildings.

CMHC Project Officer : *Duncan Hill*
Division : Policy and Research Division
AVAILABILITY : Product is not yet available

CIDN : 19340200
STATUS : Ongoing

CHARACTERIZE THE PERFORMANCE OF A WATER LOOP HEAT PUMP SYSTEM IN A MULTI-UNIT RESIDENTIAL BUILDING

Two-pipe water loop heat pump systems represent an innovative approach to heating and cooling multi-unit residential buildings. The system consists of a central water distribution system that distributes moderately warm water to each apartment in the winter and cool water in the summer. An in-suite heat pump fan coil unit is then used to heat or cool the apartment depending on the season using the central water loop as a heat source or a heat dump. In theory, the system will allow for simultaneous heating and cooling of different areas of the building by redistributing heat to where it is needed. This ability is thought to offer significant energy savings but the extent to which this may be the case has not been evaluated. CMHC is undertaking a project to characterize the performance of a water loop heat pump system in a multi-unit residential building in Ottawa so that the potential for energy savings can be assessed. The project will evaluate energy consumption, and operational and maintenance issues over a one-year period.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 18990200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

EXPLORING VENTILATION SYSTEMS FOR MURBS IN MARITIME CLIMATES

CMHC, in cooperation with the Homeowner's Protection Office of British Columbia, will conduct a research project to study two key ventilation issues affecting multi-unit residential buildings in the moderate coastal regions of Canada. Specifically, the project will evaluate the extent to which moisture laden outdoor air can be used to control indoor moisture loads without mechanical air conditioning or dehumidification. The project will also assess the ability of simple semi passive ventilation systems to exchange, condition, distribute and circulate air within individual apartments. Semi-passive ventilation systems offer many advantages to conventional MURB ventilation but the extent to which they can meet ventilation needs under varying indoor outdoor conditions and occupant lifestyles must be explored. The projects will be undertaken concurrently and will be used to produce guidelines for ventilation systems in multi-unit residential buildings in mild coastal climates.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 33170200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

INVESTIGATE THE FEASIBILITY OF HUMIDISTAT CONTROLLED HEATING TO CONTROL MOISTURE AND PREVENT CONDENSATION INDUCED MOLD PROBLEMS IN HOUSES

This project will investigate the feasibility of humidistat controlled space heating strategy to regulate the temperature and humidity levels in dwellings to prevent condensation and mold growth while realizing energy savings. Existing literature and data on this strategy will be compiled from literature searches of available research, data and other source materials on humidistat controlled space heating, as well as interviews or site visits, where this technique has been used. The aim of the study is to determine if this approach is feasible for houses and apartments, and to provide information system design and configuration. This moisture and heating control strategy is applicable when occupants want to temporarily (short or long-term) maintain low interior temperatures to conserve energy while preventing humidity levels from increasing above the critical point at which condensation and mold growth could occur.

CMHC Project Officer : *Ken Ruest* ***CIDN*** : 36980200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

BEST PRACTICE GUIDES UPDATE

This project will revise, one at a time, the five existing Best Practice Guides, starting with Brick Veneer Steel Stud published in 1996. New research and user feedback from seminars based on the guides and from CMHC's web site indicate that some text and details need updating. Partnerships will be developed with interested parties for input, review and promotion. A national competition will be held to select a consultant for each guide who will be responsible for coordinating and producing the revision work. Each consultant will work with an advisory committee, specific to each guide, who will participate in drafting the new edition. The advisory committee will include practitioners, industry representatives, manufacturers and regulators. The work will include a thorough study of the existing Guide, an analysis of users' feedback, and roundtable critique sessions. Public sessions will be held to discuss the proposed revisions. The consultant will then collect the information, produce the revised manuscript and obtain consensus from the advisory committee. The revised Brick Veneer Steel Stud guide is currently being reviewed by the advisory committee, and should be complete in 2010.

CMHC Project Officer : *Barry Craig* — ***CIDN*** : 23780200
Division : Policy and Research Division — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

DESIGN/CONSTRUCTION OF ENERGY EFFICIENT MULTI-UNIT RESIDENTIAL BUILDINGS (MURBS) IN MILD COASTAL CLIMATES

This project will explore the unique challenges of promoting, designing and constructing energy efficient multi-unit residential buildings (MURBs) in the mild climate of the lower mainland of British Columbia. The project will identify the challenges and will explore and evaluate the opportunities for achieving higher levels of energy efficiency in MURBs through improved wall design, increased airtightness and compartmentalization, and efficient and effective mechanical ventilation. Seasonal overheating issues will also be explored as a means of preventing the whole scale adoption of mechanical air-conditioning systems. The project will be implemented in a MURB so that the costs and benefits of the selected measures can be assessed. Based on the outcomes of the project, recommendations for improving the design and construction of energy efficient MURBs in the lower mainland of BC will be developed.

CMHC Project Officer : *Woytek Kujawski* — ***CIDN*** : 37530200
Division : Policy and Research Division — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available — ***NEW***

DEVELOPMENT OF GUIDELINES FOR FAN-COIL UPGRADES TO IMPROVE ENERGY EFFICIENCY AND THE INDOOR ENVIRONMENT IN EXISTING MULTI-UNIT RESIDENTIAL BUILDINGS

This study will undertake an investigation of opportunities to improve the performance of fan-coil systems in existing multi-unit residential buildings in terms of energy efficiency and indoor air quality. The study will review heating/cooling fan-coil design, from the historic to the current, as well as design, installation and manufacturing practices. It will also seek to establish the engineering and scientific basis for fan-coil problems such as mold, rust, leakage and noise and categorize design and maintenance opportunities that can lead to a range of potential remediation approaches with varying capital and maintenance cost implications. Two fan-coil preliminary retrofit guides will be developed for discussion that will cover design, implementation and maintenance, one for a technical (designer) audience and one for an owner-property manager audience.

CMHC Project Officer : *Mark Salerno* — ***CIDN*** : 36480200
Division : Policy and Research Division — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

ENGINEERED BUILDING ENVELOPE SYSTEMS FOR OUTDOOR/INDOOR CLIMATE EXTREMES

CMHC is contributing to a National Research Council project to identify indoor conditions and weather in northern and northern-coastal communities, and select appropriate building envelope assemblies for extreme climates. The project assesses the hygrothermal performance of these assemblies by computational and laboratory testing, measures air leakage by means of blower door tests and produces performance parameters for heating and high humidity climates. The project also analyzes the energy and environmental impact of proposed building envelope assemblies. The research findings will be published in a research report, and presented in seminars throughout Canada and the North.

CMHC Project Officer : *Barry Craig* ***CIDN*** : 29600200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

FIELD REVIEW OF INSULATION RETROFITS OF SOLID MASONRY STRUCTURES

This project will investigate the condition of solid masonry wall assemblies that have been retrofitted with interior insulation to reduce energy use and enhance occupant comfort. Site investigations will visually assess the condition of masonry structures and adjacent insulation and framing layers on the exterior and interior of the wall assemblies. This information is required as there is a general perception in the housing industry that the application of interior insulation to solid masonry wall assemblies will cause the walls to deteriorate due to changes in the heat, air and moisture regimes to which the walls are exposed. This work will result in a compilation of case studies of solid masonry insulation retrofit projects and the development of guidelines for assessing and insulating solid masonry buildings. Case studies will be published as Better Building Case Studies and the knowledge gained through the case studies will be documented in a research publication.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 30840200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

GUIDELINES FOR THE RETROFIT OF UNINSULATED MASONRY WALLS

Investigations of previously retrofitted solid masonry walls have been performed to determine the impact that the interior application of insulation has on the durability of the walls. The findings of the investigations will be published as case studies. Case studies will include a 120 year old solid masonry building in Montreal that was insulated 15 years ago by the application of spray applied polyurethane insulation on the interior of the walls, a 50 year old solid masonry office building in Ottawa that was insulated on the interior 8 years ago and several 1800's vintage houses and apartment buildings. Preliminary indications are that the interior application of insulation has not adversely affected the durability of the masonry walls of the case study buildings but further investigation will be required to confirm that this conclusion generally holds true for other buildings.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : N/A
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

HIGH PERFORMANCE THERMAL INSULATION SYSTEMS IN BUILDING APPLICATIONS

CMHC will contribute funding to the Institute for Research in Construction (IRC) in support of its efforts to develop a high performance thermal insulation system and its contributions to a related International Energy Agency Annex in High Performance Insulating Systems. IRC will develop new nano-porous materials for use in vacuum insulation panels and the facility required to test and evaluate the insulation system. Based on the development of the material and the testing, IRC will produce a report on the high performance thermal insulation system it develops and the potential applications and guidelines for use. This project will serve as CMHC's contribution to the building of research capacity at the Institute for Research in Construction in the field of high performance thermal insulation systems. Potential applications within building envelope systems will be conceptualized in order to generate awareness of how this futuristic form of insulation may be eventually applied.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 33630200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

INNOVATIVE BUILDINGS AND CONTINUING EDUCATION ARTICLES FOR ARCHITECTS

CMHC develops and publishes continuing education articles and case studies of innovative buildings for architects. These publications provide technical information on a variety of subjects, especially those related to building envelope issues. The Innovative Building Case studies provide examples of innovative systems or processes, which can help improve industry knowledge. New web-based learning articles requested by the architects' associations and the documentation of additional Innovative Building case studies are ongoing. The latest on-line articles will include a discussion of brownfield development and sustainable community infrastructure.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 3366-PLN05
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is available on the web

LOAD PROFILES IN MULTI-UNIT RESIDENTIAL BUILDINGS: PILOT STUDY ON LOAD PROFILING IN METRO TORONTO HOUSING

This project will describe load profiling work underway in Metro Toronto Housing Corporation multi-unit residential buildings. The project will characterize thermal, electrical power and water requirements in the apartment buildings and will also identify technical issues encountered in load monitoring and data interpretation. This project is being used as a pilot project to identify the factors that will have to be considered in a larger project being planned by CMHC and Natural Resources Canada to assess the energy and water load profiles in low and high-rise housing. The results of the study will be published as a CMHC Research Highlight.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 22010200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

REVISIONS TO BRICK VENEER STEEL STUD BEST PRACTICE GUIDE

The objective of this project is to produce a revised version of CMHC's Brick Veneer Steel Stud Best Practice Guide, published in 1996. New research and user feedback from seminars based on the guide and from CMHC's web site indicate that some details need updating. Partnerships have been developed with interested parties for input, review and promotion. The consultant responsible for the revisions is working with an advisory committee, specific to the BVSS guide, which participates in drafting the new edition. The advisory committee includes practitioners, industry representatives, manufacturers and regulators. The work began with a thorough study of the existing Brick Veneer Steel Stud Guide, including an analysis of users' feedback. The consultant then collected the information, produced the revised manuscript and is now in the process of obtaining consensus from the advisory committee. Revisions to the text and details are with the advisory committee for their comments. The revised Brick Veneer Steel Stud Guide should be in print in 2010.

CMHC Project Officer : *Barry Craig* ***CIDN*** : 23780200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

CANADIAN WOOD-FRAME HOUSE CONSTRUCTION TECHNIQUES AND PRACTICES FOR APPLICATION IN OTHER CLIMATES

This research project will demonstrate how to adapt Canadian wood-frame house construction techniques and practices in other countries with different climates. The resulting research report entitled "Durable Wood-frame Construction for All Climates" is divided into four parts. The first and second parts introduce wood-frame construction and cover well-established building science principles for building envelope durability. The third part breaks new ground in the development of a series of methods that allows a designer or builder to select a particular wall construction based on local site conditions and climatic data drawn from sources, such as Koeppen climatic data and the NASA weather data base maintained on the world wide web. The fourth part provides examples of durable wood-frame building assemblies for most climates. The report focuses on the durability of the building envelope, and covers other related aspects of construction (e.g. ventilation and insects).

CMHC Project Officer : *Barry Craig* ***CIDN*** : 27290200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

GLOSSARY OF HOUSING TERMS - UPDATE

This project reviews the current edition of Glossary of Housing Terms and conducts research to identify new terms and definitions which are missing. The Glossary of Housing Terms was last updated in 1995, resulting in the absence of a number of new housing terms, some of which are included in CMHC's new information products. Examples of new housing terms missing from the Glossary of Housing Terms include: surfactants, enthalpy recovery ventilator, building science, polyolefin, xeriscaping, pyrite, stachybotrys chartarum and brownfields. All the existing terms and definitions have been reviewed to ensure they are still appropriate and that the definitions are accurate. Construction related acronyms and abbreviations, and terms common to multiple unit residential buildings have also been added.

CMHC Project Officer : *Barry Craig* ***CIDN*** : 33070200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

IMPROVED PREDICTION OF SEISMIC RESISTANCE OF PART 9 HOUSES

Currently available approaches for the prediction of seismic resistance of conventional wood-frame construction (that is, buildings conforming to Part 9 of the NBC) are not able to predict the seismic resistance in a reliable manner. Experience in earthquakes and recent shake table tests of two-storey specimens have demonstrated generally good performance, but the limitations of this favourable behaviour are not well defined. A funding grant from CMHC External Research Program has been provided to Forintek Canada Corporation (FP Innovations) to undertake a research project, to develop simple mechanics-based methods for the prediction of seismic resistance of conventional wood-frame ("Part 9") houses. The work under this grant will present a quantitative basis for possible Part 9 seismic provisions of the NBCC based on data from past and ongoing work at Forintek and pertinent data from the literature. The work will limit itself to regular geometric shapes of wood-frame construction and will not consider torsional seismic effects.

CMHC Project Officer : Silvio Plescia
Division : External Research Program
AVAILABILITY : Product is not yet available

CIDN : 34380208
STATUS : Ongoing

RACKING PERFORMANCE OF WOOD SHEAR WALLS CONSISTING OF FINGER-JOINTED STUDS

In order to make lumber more sustainable and to reduce cost and waste, the use of finger-jointed wood studs is now permitted in building codes and is becoming increasingly common in residential construction. However, the strength of these studs when subject to tensile stress is not well understood. This 2008 External Research Program project will test the racking strength of finger-jointed wood studs used in shear walls. The data produced by this research will inform the designers of codes and standards of the comparative performance of finger-jointed and regular dimensional lumber studs, when used in shear walls. It will also measure the effect on racking strength of the number of joints in the stud.

CMHC Project Officer : *Barry Craig*
Division : External Research Program
AVAILABILITY : Product is not yet available

CIDN : 38840206
STATUS : Ongoing

REDESIGN PRODUCTION PROCESS IN HOUSING CONSTRUCTION USING LEAN PRINCIPLES AND VALUE STREAM MAPPING

The housing construction sector is distinguished from other parts of the construction industry and offers the closest analogy to the manufacturing industry. However, the home building process is still managed in the same way as in other sectors of the construction industry. The aim of this External Research Program project is to develop a lean process for housing construction that improves the efficiency and reduces overall throughput time.

CMHC Project Officer : *Barry Craig*
Division : External Research Program
AVAILABILITY : Product is not yet available

CIDN : 36260202
STATUS : Ongoing

HOUSE CONSTRUCTION

SEISMIC ISOLATION OF RESIDENTIAL WOOD FRAME AND LOW- AND MEDIUM-RISE MASONRY BUILDINGS

McMaster University has been granted funding through the CMHC External Research Program to investigate the application of a novel and economical fibre reinforced elastomeric base isolation system for both light-weight wood frame and low- and medium- rise unreinforced masonry residential buildings. The objective is to determine if an economically viable base isolation system can be developed to alter the natural period of the building and isolation system out of the range of maximum earthquake intensity for seismically vulnerable residential buildings. The test program will include the scaled model shake table testing of both fixed-base and isolated-base foundation buildings to assess their dynamic response and a parametric analysis conducted for four seismic jurisdictions across Canada to assess the effectiveness of the base-isolation system to mitigate or reduce the seismic loads on the building. The project commenced in the fall of 2008. Completion of the project is expected by end of 2010.

CMHC Project Officer : *Silvio Plescia* ***CIDN*** : 38840214
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SUSTAINABLE BUILDING SCIENCE BEST PRACTICES

The objective of this project is to consolidate energy-efficient and sustainable building science best practices into one comprehensive illustrated source that will serve as a text book and training manual for building science courses. It will be used in architectural programs at colleges and universities, and by builders and designers. The result of this research will be a common reference that describes sustainable building science for Canadian construction that is based on rigorous scientific research and testing, and energy conservation measures and that demonstrates best practices. It will be tailored to existing teaching curricula and it will be extremely useful to architects, engineers and building scientists resulting in an accurate and common understanding of sustainable building science principles and their interrelationship with one another.

CMHC Project Officer : *Barry Craig* ***CIDN*** : 35610200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

HOUSING RESEARCH

CONTRIBUTION TO RESEARCH PROJECTS AT THE CANADIAN CENTRE FOR HOUSING TECHNOLOGY (CCHT)

This project will support research to evaluate innovative housing technologies at the Canadian Centre for Housing Technology (CCHT). Research at the CCHT helps the residential building industry to better understand house performance, new technologies and products by increasing knowledge. This helps the adoption of innovative technologies in mainstream markets and supports consumer acceptance. Research at the CCHT is largely focused on assessing impacts on energy consumption but other performance indicators such as indoor air quality and comfort can also be assessed under various climatic conditions.

CMHC Project Officer : *Ken Ruest* ***CIDN*** : 38290200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

HOUSING RESEARCH

SUPPORT FOR THE 12TH CANADIAN BUILDING SCIENCE AND TECHNOLOGY CONFERENCE, MONTREAL, QUÉBEC, MAY 2009

CMHC provided financial support for the 12th Canadian Conference on Building Science and Technology, which was held in Montreal, Québec, on May 6-8, 2009. CMHC has supported past Canadian Conferences on Building Science and Technology in recognition of the important role that the conferences have played in the dissemination of technical housing research, the promotion of sharing technical information and discussion of knowledge and experiences by the building science community and the importance of a Canadian forum for building science issues. The conference proceedings will be available on loan from the Canadian Housing Information Centre.

CMHC Project Officer : *Silvio Plescia*
CIDN : 37490200
Division : Policy and Research Division
STATUS : Ongoing
AVAILABILITY : Product is not yet available

INDOOR ENVIRONMENT

INVESTIGATING THE RELATIONSHIP BETWEEN INDOOR AIR QUALITY AND SEVERE RESPIRATORY TRACT INFECTIONS IN INUIT INFANTS IN BAFFIN REGION, NUNAVUT

CMHC has contributed to a study investigating the relationship between indoor air quality and severe respiratory tract infections in Inuit infants in Baffin region, Nunavut. The initial work was carried out in conjunction with the Children's Hospital of Eastern Ontario, Health Canada, Natural Resources Canada, the Nunavut government and Nunavut health and housing agencies. Testing took place over the winter of 2003 in 20 houses in Cape Dorset. It included air quality measurements, blower door testing, and long term air change rate measurement. These results show that some of the houses are under ventilated, but that air quality is similar in many aspects to more southern housing. A follow-up project with the partners explored ventilation solutions in Nunavut communities. The second phase surveyed air change rates, carbon dioxide levels, and occupancy factors in 100 houses in four Nunavut communities, to see if the Cape Dorset results are typical. Low ventilation rates were measured in many of the houses and corresponding high CO2 concentrations resulted. A CMHC Research Highlight on the pilot project and the 100 house survey has been issued ("Nunavut Housing Ventilation Research 2003-2005", Research Highlight Technical Series 05-116). The most recent phase involved the installation of HRVs in 100 existing Nunavut houses and an analysis of the effects on occupant health. The project team hoped to have the HRVs installed in the fall of 2006, with the health monitoring taking place over the winter of 2006/2007. However, problems with weather, contractor performance, equipment installation, and finding test houses delayed the work. In the end, there are about 63 HRV units installed in three communities, but not all returned good data. Conclusions were limited by the small sample size. The project results are being reported in scientific journals.

CMHC Project Officer : *Don Fugler*
CIDN : 27570200
Division : Policy and Research Division
STATUS : Ongoing
AVAILABILITY : Research highlight is available

LET'S CLEAR THE AIR INDOOR AIR QUALITY (IAQ) INITIATIVE

This initiative delivers information on indoor air quality in the home to targeted audiences, the end result of which will benefit Canadian homeowners and occupants. Basic information to increase awareness and appreciation of indoor air problems is through the one-day Let's Clear the Air seminar (for housing and health professionals) or the Build and Renovate to Avoid Mold workshop (for builders, renovators, architects, real estate and insurance appraisers). A two-day Mold Remediation Workshop trains builders, renovators and contractors on how to remediate mold safely and properly. Qualified individuals can also proceed to the CMHC Residential Indoor Air Quality Investigator Training Program. Individuals who complete the training program acquire the skills to inspect homes for IAQ problems and to provide informed advice to homeowners on how to correct these problems. As a private business, they offer their professional services to the public for a fee. For referral purposes, a list of persons having completed the training is available from CMHC offices.

CMHC Project Officer : *Regina De La Campa* ***CIDN*** : 16230300
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Seminar/training is available

REVIEW OF THE RELATIONSHIP BETWEEN HOUSE VENTILATION RATES AND HEALTH

This work is attempting to establish the relationship between adequate ventilation and health (or inadequate ventilation and poor health), through literature searches and appropriate field testing. The project should lead to a better understanding of the relationship between house ventilation and occupant health. If the project establishes a strong correlation between good ventilation and healthy residents, it will be useful material for building codes, medical authorities, ventilation standards, and the ventilation industry. CMHC has contracted with the Quebec public health agency (INSPQ) and National Research Council to obtain access to the data of their joint project on asthmatic children and house ventilation rates in the Quebec City area. The first year involves house and occupant characterization. All the houses will have two airtightness tests and 4-5 tracer gas air change rate tests, as well as measurements of the indoor air quality and occupant health status. Once the current condition of these 100+ houses is known, the second year of research will show whether augmenting the house ventilation rate improves the health of occupants.

CMHC Project Officer : *Don Fugler* ***CIDN*** : 35560200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SUPPORT FOR IAQ/HOUSE CHARACTERIZATION AND DATA ANALYSIS - MCMASTER UNIVERSITY CHILD STUDY

CMHC is supporting this multi-year, inter-institute collaborative research study to address the influence of indoor environments on asthma and allergy. The study will follow 5000 pregnant women and their children, from birth to 5 years of age, to understand the indoor environmental exposures that may result in allergic and respiratory disease. Among other things, the research will provide information on housing characteristics, occupant factors related to the operation of the houses and the presence of indoor biological contaminants. The information will allow CMHC to develop housing strategies to help provide for clean indoor air environments in Canadian households. CMHC has led two rounds of in-depth technical training to research assistants who will use home assessment questionnaires during walk-through home visits with the participating families. The pilot phase of the study closed on December 15, 2008, with 200 mothers and children recruited over a two month period. Important information on recruitment strategies, questionnaires, home assessments and birth events has been collected. The information is in the

process of being reviewed before moving forward to the implementation phase of the main study, planned to begin in May 2009.

CMHC Project Officer : *Regina De La Campa* ***CIDN*** : 35580200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

MOISTURE AND MOLD

CMHC DEHUMIDIFIER FIELD STUDY

This study was conducted to determine the usefulness of dehumidifiers in Canadian houses. Air temperature and relative humidity were continuously recorded in the basement and upper floor of twenty-one houses located in three main climatic regions in Canada. The homeowners recorded wood moisture content and surface temperatures over a two-year period and also measured the amount of water collected by a dehumidifier during the second year. The measurements showed lower moisture content of the basement air compared to outside air and reduced moisture content of wood in the basement when the dehumidifiers were running during the warm summer months.

In all regions of Canada, the operation of a dehumidifier reduces dampness indoors. In the milder and coastal regions, operation of a dehumidifier throughout the year is recommended.

Prepared by Buchan, Lawton, Parent Ltd. CMHC Project Officer: Regina de la Campa. Ottawa: Canada Mortgage and Housing Corporation, 2008. 85 pages (2.54 MB)

Note: No. 09-106 in the Research Highlights Technical Series summarizes the results of this research and is available on the CMHC web site

STATUS : New Completed Report and Research Highlight
AVAILABILITY : Canadian Housing Information Centre and
ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/CMHC_DEHUMIDIFER(w)_may_29.pdf

CONTRIBUTION TO THE INDUSTRIAL RESEARCH CHAIR IN ALLERGENS AND TOXINS FROM MOLDS IN THE BUILT ENVIRONMENT

There is no method to obtain a quick and inexpensive determination of the nature of mold contamination in a house. A more fundamental understanding of the by-products of mold that are harmful to people is needed along with knowledge regarding the thresholds that should be avoided and cheap and reliable ways of classifying moldy and non-moldy houses. CMHC is supporting the ongoing research of the National Science and Engineering Research Council Chair on Allergens and Toxins from Molds in the Built Environment at Carleton University. The first five years work of the Chair developed the expertise to identify human allergens, produce antibodies specific to each allergen and isolate and test the effect of toxins on lungs from Stachybotrys chartarum, Aspergillus versicolor and Penicillium chrysogenum, three representative fungi found in houses that require large, medium and low amounts of moisture. The second five years, starting in June 2006, will expand the expertise to a larger number of molds to make it feasible to use these reagents as a cheap and reliable way of testing for mold contamination in houses.

CMHC Project Officer : *Regina De La Campa* ***CIDN*** : 34070200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

LITERATURE REVIEW ON HISTOPLASMA, BLASTOMYCES AND CRYPTOCOCCUS GATTII AND THE IMPLICATIONS FOR THE DESIGN, OPERATION AND MAINTENANCE OF HOUSING

A thorough literature review of Histoplasma capsulatum, Blastomyces dermatitidis and Cryptococcus gattii, three fungi that cause infectious diseases in people was conducted by a mycology expert. Histoplasmosis occurs from exposure to feces of birds and bats, while blastomycosis occurs after exposure to the spores in soil. Infections due to cryptoccoccus gattii are limited to Vancouver Island, though cases have been seen in Vancouver. The literature review will form the basis of housing advisories on how to avoid exposure to these fungi in residential settings. The project is a collaborative effort between CMHC and Health Canada.

CMHC Project Officer : *Regina De La Campa* ***CIDN*** : 36350200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

MODIFY AND UPGRADE WALLDRY COMPUTER PROGRAM

The objective of this project is to modify and upgrade WALLDRY, a 1980's computer program developed by CMHC, which models the flows of moisture, heat and air through wood-framed outer wall assemblies in response to given external climatic loads and interior temperature and humidity conditions. The original QBASIC code used in WALLDRY will be recast using a Windows-based computing language to overcome the memory management limitations inherent in a DOS based program. The upgrades would also incorporate corrections applied to any of the algorithms from the use of WALLDRY in recent simulation studies, programming enhancements in a user-friendly environment, including input capabilities and a material properties database, and to provide a more useful means of presenting the output of interest.

CMHC Project Officer : *Silvio Plescia* ***CIDN*** : 25050200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

MOLD REMEDIATION WORKSHOP

The focus of the Remediating Mold workshop is on information required by builders and contractors involved in renovation and clean-up of mold contaminated houses. As a result of rapidly evolving knowledge in this field, the workshop incorporates current and substantive information from authoritative sources. This workshop addresses mold cleanup in general and includes information on the precautionary measures required to protect workers and occupants, and presents best practices for mold remediation.

CMHC Project Officer : *Regina De La Campa* ***CIDN*** : 23800200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

POTENTIAL FOR MOISTURE PROBLEMS DUE TO PLASTIC SHEETING IN WALL ASSEMBLIES

This project examined whether plastic air-vapour barriers currently used in Canadian wall assemblies are an asset or a problem. There has been significant criticism recently of the use of plastic in above-grade and basement wall assemblies, in that plastic limits the ability of the wall to dry into the house, and that it provides a condensing plane for water vapour driven into the wall when the sun heats the exterior sheathing. The research assessed the criticisms levelled against plastic sheeting and compared the use of plastic to other alternatives, using field tests and hygrothermal modelling. The first year of field testing in a new house and a test hut was completed in the summer of 2006. Testing took place in basement and above-grade walls. Reporting on the field testing and the ensuing simulation and analysis was published in the fall of 2007. The results were mixed. In some cases, depending on the test conditions, the walls with poly created high moisture situations; in other cases, the no-poly walls had higher moisture and mold. The field testing of the above-grade walls was extended for another year to look at brick wall venting and alternative vapour barriers (e.g. paint). A report on the second year of field testing was delivered in 2008 and a Research Highlight has been prepared. The second phase testing found that relatively simple fixes essentially resolved the moisture problems both in the poly and no-poly walls.

CMHC Project Officer : *Don Fugler* ***CIDN*** : 32150200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

TESTING THE EFFECTIVENESS OF CLEANING TO REDUCE EXPOSURES OF OCCUPANTS TO MOLD

This study investigated the effectiveness of intensive, HEPA vacuuming practices in the reduction of fine dust in 6 urban homes in the Ottawa area over a six week period. The houses in the study were average homes and not selected for the presence of mold or any other contaminant. The objectives of the study were to develop a cleaning protocol using a HEPA filter-equipped vacuum cleaner and to determine the effectiveness of the HEPA vacuum cleaner in reducing dust and, in particular, fine dust over time. The results showed that a one-time vacuuming session removed a substantial fraction of the total dust extracted over six weeks. However, three to four vacuuming sessions following this strict protocol were needed to bring the level of fine dust to a low and steady value. A reduction in the level of fine dust is desirable as other studies have correlated exposure to airborne contaminants contained in fine dust to the amount of settled dust per unit area in homes.

The second phase of this study involved a First Nations community while actual remediation work to fix mold problems was being done. The purpose of the study was to test whether HEPA vacuuming practices could be used to reduce occupants' exposure to mold as a short-term measure in houses where mold was a problem and remedial measures were being performed or planned. The results were compared to the levels of contaminants in fine dust of houses without an identified mold problem found in the study described above. The results indicate that houses that are contaminated by mold but that cannot be remediated immediately can benefit from reducing the levels of dust. As dust levels are reduced by thorough and regular HEPA vacuuming, occupant's exposure to mold and other contaminants in dust can also be reduced.

CMHC Project Officer : *Regina De La Campa* ***CIDN*** : 24480200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

MOISTURE AND MOLD

WATER PENETRATION THROUGH THINNER VENEER WALL

Ryerson University was awarded a grant, under CMHC's External Research Program, to undertake this research project to study the potential for reducing the thickness of masonry cladding (or redesigning masonry units to be lighter and use less material) and still maintain acceptable durability and water penetration performance. The project will focus on issues of resistance to water penetration and durability and will specifically investigate the impact of dimensional changes on the water penetration into the wall (air) cavity. The project is ongoing with its completion expected by December of 2009.

CMHC Project Officer : *Silvio Plescia*
Division : External Research Program
AVAILABILITY : Product is not yet available

CIDN : 36260215
STATUS : Ongoing

NORTHERN HOUSING

CMHC CONTRIBUTIONS TO 2010 NORTHERN HOUSING FORUM

This project will provide funding for the 2010 Northern Housing Forum that will provide a venue for northern housing providers, builders, architects, building scientists and other northern housing professionals to discuss housing projects and innovations across the circumpolar region. In addition, the event will provide a forum for discussing ongoing northern housing research, identifying needed northern housing research, and provide an opportunity to develop partnerships for carrying out this work. An organizing committee, chaired by CMHC, is developing the conference theme and organizing panel discussions and presentations on a variety of northern housing topics. The 2010 Northern Housing Forum is being hosted by the NWT Housing Corporation and will be held in Inuvik, NWT from March 23 to 25, 2010.

CMHC Project Officer : *William Semple*
Division : Policy and Research Division
AVAILABILITY : Product is not yet available

CIDN : 38280200
STATUS : Ongoing
NEW

FUNDING SUPPORT FOR THE NORTHERN SCIENTIFIC TRAINING PROGRAMME

The Northern Scientific Training Programme (NSTP) supports northern research studies by providing universities with funding to help offset the costs associated with travel and accommodation in the North. This project will provide support for community-based research and support to traditional knowledge through the Arctic Colleges and Northern Research Institutes. The project will increase research capacity within the North, contribute to the research work, and provide northern peoples with enhanced learning, training and employment opportunities within their communities. The project will provide funding to the NSTP for a period of five years, from 2009 to 2013.

CMHC Project Officer : *William Semple*
Division : Policy and Research Division
AVAILABILITY : Product is not yet available

CIDN : 37850200
STATUS : Ongoing

INTEGRATED DESIGN AND EVALUATION OF A CONSTRUCTED NORTHERN SUSTAINABLE HOUSE (E/2 PROTOTYPE)

In this partnership project, two "Sustainable Northern Houses" have been designed by CMHC in partnership with a Tr'ondek Hwech'in First Nations community in the Yukon and the Nunavut Housing Corporation in Arviat, Nunavut. The houses have been designed to consume less than 50% of the Model National Energy Code of Canada for Houses energy requirements, and are suited to the northern culture and lifestyles. The project has incorporated knowledge and connections that were gathered in northern design charrettes, with the design work for each Sustainable Northern House carried out in consultation with the northern community and territorial northern housing provider. Construction of the Tr'ondek Hwech'in House was completed in January, 2008. Materials for the NHC Arviat House will be sea-lifted to the community during the summer/fall of 2009 with construction to be carried out in the fall of 2009 or spring of 2010. The evaluation of the project will include monitoring the energy performance of the constructed houses, carrying out a cost/benefit analysis of the energy savings of each Sustainable Northern House vs. a typical new house in the community, and carrying out an analysis of the success of the cultural issues being addressed in the design. CMHC facilitated design workshops, was the lead in designing the houses, and is undertaking the performance evaluation of the Sustainable Northern House Prototypes. A 15 month monitoring project on the completed Tr'ondek Hwech'in House began in February 2008. The project is sponsored in part by the Program for Energy Research and Development (PERD). The research will be completed by December 2011.

CMHC Project Officer : *William Semple* ***CIDN*** : 33240200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

MODEL FOR SUSTAINABLE FIRST NATIONS NORTHERN HOUSING AND COMMUNITIES

This project will assess options for sustainable northern housing and communities. The project will support a northern community to develop housing and community plans that respond to a wide array of technical, social, economic and cultural needs. The project will engage the community through an integrated design charrette, technology assessments, cost-benefit analysis and downstream community capacity requirements to design, build, operate and maintain their housing. The research will support the community as it develops its sustainable community plan.

CMHC Project Officer : *William Semple* ***CIDN*** : 38240200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available ***NEW***

See also: ENGINEERED BUILDING ENVELOPE SYSTEM FOR OUTDOOR/INDOOR CLIMATE EXTREMES, p. 25

INVESTIGATING THE RELATIONSHIP BETWEEN INDOOR AIR QUALITY AND SEVERE RESPIRATORY TRACT INFECTIONS IN INUIT INFANTS IN BAFFIN REGION, NUNAVUT, p. 30

ACHIEVING 90% REDUCTION IN ENERGY CONSUMPTION IN SUSTAINABLE NORTHERN HOUSES, p. 37

SUSTAINABLE HOUSING IN THE NORTH, p. 51

RENOVATION AND INSPECTION

CANADIAN HOME INSPECTORS AND BUILDING OFFICIALS (CHIBO) - PHASE III NATIONAL INSPECTION INITIATIVE

This partnership project with the Canadian Construction Sector Council provided assistance to the Alliance of Canadian Building Officials' Association (ACBOA) to implement the National Accreditation and Certification Program for building officials. CMHC's support was used to pilot the certification model, to develop necessary application assessment tools, and to establish governance committees and boards as required by the certification models. The implementation of the National Certification and Accreditation Program for municipal building officials will help to harmonize the knowledge and experience requirements for building officials, and enhance the capacity and standing of the building officials' industry in Canada. The National Program has been implemented since June 2008.

CMHC Project Officer : *Ken Ruest*
Division : Policy and Research Division
AVAILABILITY : Product is not yet available

CIDN : 35040200
STATUS : Ongoing

See also: Socio-economic research on Renovation and Inspection, p. 68

SUSTAINABLE DEVELOPMENT & HEALTHY HOUSING

ACHIEVING 90% REDUCTION IN ENERGY CONSUMPTION IN SUSTAINABLE NORTHERN HOUSES

This project will apply Net Zero (EQuilibrium) technology to the design of a house to be built in the Yukon with the objective of having the home consume 90% less energy than the amount used by the house were it to be built to the Model National Energy Code for Houses (MNECH). CMHC provides technical information and support for designs and architectural drawings prepared by the Tr'ondek Hwech'in First Nation Band. A mechanical consultant with experience in the design of renewable energy systems and proficient with Hot2000 computer modelling is responsible for designing mechanical systems, providing layout drawings, and simulating estimated energy consumption for a family of two adults and two children. The energy consumption of the dwelling will be monitored for one year following occupancy. The developer/housing provider is responsible for providing a detailed description of the design and technologies used, as well as itemized cost comparisons to a similar house conforming to the MNECH and to the house built by the Tr'ondek Hwech'in First Nation Band. The project will produce a research report that may assist in designing and building sustainable housing and establish the feasibility of near net zero energy houses in the North.

CMHC Project Officer : *Barry Craig*
Division : Policy and Research Division
AVAILABILITY : Product is not yet available

CIDN : 38260200
STATUS : Ongoing

ADVANCEMENT OF COMPETENCY IN INTEGRATED SUSTAINABLE BUILDING DESIGN - SUPPORT OF CONCORDIA UNIVERSITY IN THE 2005 'SOLAR DECATHLON'

In this project, and as one of various contributors, CMHC supported the Canadian team entry led by Concordia University to participate in the 2005 Solar Decathlon in Washington D.C. Based on a preliminary competition, nineteen teams were selected to participate in this event; the majority of the teams were from the United States, with one each from Canada, Spain and Puerto Rico. The nineteen university teams built small solar houses, of about 60 to 70 square metres in size, on the National Mall in front of the Capital Building in October 2005. The objective was to design a completely solar powered house that is self-sustaining for an entire week. Specified requirements included minimum lighting levels, acceptable interior temperature range, water usage and hot water temperature levels. The houses had to be able to accommodate normal domestic tasks such as laundry, cooking and showering. CMHC's involvement included financial and implementation support to the process, technical advice and guidance, and creating and transferring knowledge on renewable energy based sustainable housing. This project's overall outcomes were:

1) to illustrate how solar energy can improve Canadians' quality of life: solar energy is clean; it significantly reduces pollutant emissions; and solar energy is renewable thereby increasing a nation's energy security;

2) to teach the solar decathletes and the public about how energy is used in their daily lives and to illustrate the energy intensity of various daily activities;

3) to demonstrate that market-ready technologies exist that can meet the energy requirements of our daily activities by tapping into the sun's power;

4) to meet these needs while providing an attractive structure in which to live, work and play.

A related long-term objective of this project is to build enhanced alliances between project partners leading to the capacity development for a future Canadian Solar Decathlon competition. The Concordia Decathlon house, the Northern Light, is currently being used as a research lab at Concordia University in Montreal.

STATUS : Completed

AVAILABILITY : There will be no product for this project

ANALYSIS OF RENEWABLE ENERGY POTENTIAL IN THE RESIDENTIAL SECTOR THROUGH HIGH RESOLUTION BUILDING ENERGY SIMULATION

Due to recent advancements in renewable energy technologies such as photovoltaic (PV) and micro-wind turbine systems, the potential for large-scale deployment of such energy sources for a more sustainable society has never been greater. The overall objective of this study was to provide technical assessment of the potential of renewable energy systems in low-rise housing.

Two sub-projects are presented. The first part of the project assesses the feasibility of adding a hybrid, renewable-energy system of roof-mounted, solar photovoltaic (PV) panels and a micro-wind turbine to existing housing. Findings relate to both increase and savings aspects of actual energy use. The analyses also showed the varying energy and environmental benefits of the proposed hybrid heating system in a typical R-2000 home. The second sub-project proposes, models and analyzes an energy-efficient, renewable energy-based heating, ventilating and air-conditioning (HVAC) and domestic hot water (DHW) heating system for new houses. The results were extrapolated to the national level to assess the potentials of Green House Gas (GHG) reduction and were found that using these technologies could result in the GHG reductions of 15% and 20% of the base case emission levels without the proposed hybrid renewable electricity generation systems.

Submitted by: Alan Fung, Joel Good, Ali Syed, V. Ismet Ugursal, Department of Mechanical Engineering, Dalhousie University. CMHC Project Officer: Woytek Kujawski. Ottawa: Canada Mortgage and Housing Corporation, 2007. (External Research Program Report) 426 pages (2983 KB)

Note: No. 08-106 in the Research Highlights Technical Series summarizes the results of this research and is available on the CMHC web site (Order number 66097)

STATUS : New Completed Report and Research Highlight

AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Analysis%20Renewable%20(w).pdf

CHARACTERIZATION OF THREE TYPES OF CLAY TO FACILITATE THE DEVELOPMENT OF CLAY-BASED ENVIRONMENTALLY FRIENDLY PRODUCTS

Clay based plaster is rare, misunderstood and poorly documented. This product has real potential, however, for sustainable development in the housing sector. This External Research Program project is a study of three types of clay in order to establish the scientific bases of knowledge on the manufacture of raw clay materials. Such plaster is usually composed, in descending order, of the following materials: sand, clay, vegetable fibre and hydrated lime putty. The project is underway and should be complete in 2009.

CMHC Project Officer : *Barry Craig* ***CIDN*** : 28920207

Division : External Research Program ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available ***NEW***

DEVELOPMENT OF A SUSTAINABLE PERFORMANCE ASSESSMENT TOOL FOR HOUSING

An External Research project was initiated to develop a sustainability performance assessment tool for housing in Canada. The project provides a framework that permits a broad-scope sustainability assessment of multi-family housing in Canada. The framework is based on SBTool, an internationally accepted assessment toolbox that allows specific ratings to be produced for a variety of regions and end uses, by adjusting scope, weights and (local) benchmarks. The system covers a full range of environmental, social and economic variables, provides internal calculation tools for the estimation of Green House Gases, based on regional emission values, and also an approximate embodied energy calculator. The version provided to CMHC has been calibrated for multi unit residential buildings, but other alternatives, such as mixed use buildings (for example residential and retail) can also be assessed. The tool with its Guide (Overview) is available for download at iiSBE (International Initiative for a Sustainable Built Environment) Website: http://iisbe.org/iisbe/sbc2k8/sbc2k8-download_f.htm. The Research Highlight on SBTool and its application to housing will be published by September 2009.

CMHC Project Officer : *Woytek Kujawski* ***CIDN*** : 28920211

Division : External Research Program ***STATUS*** : Ongoing

AVAILABILITY : Product is available on the web

INTEGRATED SUSTAINABLE BUILDING DESIGN - SUPPORT OF THE 2007 'SOLAR DECATHLON'

In this project, CMHC supported the Canadian team entry led by ETS to participate in the 2007 Solar Decathlon in Washington D.C. The objective of the competition was to design and build houses of about 60 to 70 square metres in size which are completely solar powered and self-sustaining for an entire week. Specified performance requirements were measured in ten categories, and include energy performance, lighting levels, acceptable interior temperature range, water usage and hot water temperature levels. CMHC's involvement included financial and implementation support to the process, technical advice and guidance, and creating and transferring knowledge on high performance, renewable energy based sustainable housing. The ETS-led Canadian team, Team Montréal, participated in the Solar Decathlon challenge, which ran from October 12th to 20th, 2007. The team placed an impressive 8th place overall. Following the event, the solar house, Lumen Essence, returned to Canada and is currently located at the Biosphere in Montréal. A CMHC Research Highlight documenting the features of the Lumen Essence house has been prepared and is available on the CMHC website: "Canada at the 2007 Solar Decathlon. Research Highlight Technical Series; no. 09-103" (Order number 66474).

CMHC Project Officer : *Thomas Green* ***CIDN*** : 36180200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Research highlight is available

MEASURING SOLAR PERFORMANCE

The purpose of this External Research Program project is to build and operate a measurement and monitoring program to evaluate the performance of a conventionally built house which uses a range of active and passive solar systems. It is fully off-grid, self sufficient in energy and includes a number of technologies. The intent of the project was to install and operate a number of small data collection systems over a three year period. In the fall of 2007 the monitoring moved to an alternate data management system which will produce better final results, and will give a comprehensive view of the actual performance of the house in regular use, including its operating environment.

CMHC Project Officer : *Woytek Kujawski* ***CIDN*** : 28920212
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

NSERC CANADIAN UNIVERSITY NETWORK ON "SOLAR ENERGY UTILIZATION IN BUILDINGS"

CMHC is supporting a new Natural Sciences and Engineering Research Council of Canada (NSERC) funded University Network on "Solar Energy Utilization in Buildings", to achieve the objective of enhancing the capacity of the residential industry to develop solar buildings with substantially reduced purchased energy needs. The overall vision of the Network over its five year period will be to advance the adoption of new knowledge, tools, practices and technologies for cost effective construction of solar zero-net-energy buildings in Canada. The main objectives of the Network over its five-year research program are the following:

1. To develop effective techniques for integration of solar collection, storage and utilization systems in the building envelope. 2. To develop and improve solar energy utilization technologies so as to reduce cost and raise overall efficiency. 3. To develop and demonstrate affordable, reliable, building integrated, distributed power generation systems based on solar energy for residential and commercial buildings. 4. To develop simulation design tools and methodology that may be effectively utilized throughout the design process. 5. To transfer these outputs to the end users. 6. To contribute to the development of government policies and programs aimed at fostering the adoption of solar technologies in buildings.

CMHC will seek opportunities to transfer the knowledge gained through the network research to stakeholders in the housing industry.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 34020200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

PAYBACK PERIOD FOR "GREEN" BUILDING FEATURES IN SINGLE FAMILY DETACHED DWELLINGS

This project will build a framework to profile estimates on the payback periods of different green features available for single family detached dwellings. Generic green features will be profiled to increase the understanding of the costs and benefits of "building green" in the single family market. It will enable consumers and the home building industry to objectively evaluate "green" features that they wish to incorporate into their homes.

CMHC Project Officer : *Woytek Kujawski* ***CIDN*** : 38320200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available ***NEW***

REGIONAL PILOT DEMONSTRATION OF NET ZERO ENERGY HEALTHY HOUSING

This project involves the development of a national net zero energy healthy housing demonstration and implementation initiative through an industry partnership to advance new Canadian housing towards a net zero energy consumption and low environmental impact goal. The concept involves the design, construction, demonstration and monitoring of net zero energy healthy houses in a project called the EQuilibrium™ Sustainable Housing Demonstration Initiative. To date, a total of fifteen projects from across the country have been selected in two separate national competition calls. Construction has been completed on 6 projects with the rest expected to follow in the next two years. All constructed EQuilibrium™ projects will be open for public and professional tours for a minimum time period of six months. Demonstrations will permit the EQuilibrium Teams to show their achievements to the residential building industry and consumers. Upon completion of the demonstrations, the houses will be sold and CMHC will monitor the performance of the houses for one year post occupancy. Based on the outcome of this demonstration initiative, CMHC will explore with its partners and stakeholders opportunities to expand this initiative more broadly across Canada. The EQuilibrium™ Sustainable Housing Demonstration Initiative is based on CMHC's five principles for Healthy Housing (Health, Energy, Resources, Environment, and Affordability). It combines passive solar, energy efficient design, construction and appliances, with commercially available grid tied renewable energy systems to achieve net zero energy consumption on an annual basis, reduced GHG emissions, and low environmental impact . The intended results and impacts of the EQuilibrium™ initiative are to develop strategic alliances between industry and government to reduce the energy intensity of our housing sector, mitigate household energy cost increases in the medium term, foster a growing renewable energy and sustainable housing industry in Canada, increase consumer awareness and demand for sustainable housing, and support Canada's goal of reducing pollutant and green house gas (GHG) emissions. The development of the EQuilibrium™ initiative in Canada will also help to ensure Canada's inclusion in competitive international housing markets and our next generation of value added exports. Detailed information on the EQuilibrium™ Initiative and each of the projects is available on the CMHC web site www.cmhc.ca.

CMHC Project Officer : *Thomas Green* ***CIDN*** : 35490200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is available on the web

SUPPORT FOR THE CANADIAN TEAM SUBMISSION TO THE SUSTAINABLE BUILDING (SB) 2008 CONFERENCE

This project supported the characterization of the performance of two Canadian MURBs that have implemented a wide range of innovative technologies and practices to reduce overall environmental impacts. The results of the analysis were presented at the SB08 conference as a part of the international showcase of sustainable buildings. This project will help to advance knowledge of the environmental outcomes of green building technologies and practices and provide feedback on the tools developed to undertake this analysis.

CMHC Project Officer : *Woytek Kujawski* ***CIDN*** : 37630200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SUPPORT FOR THE DEVELOPMENT OF A TECHNOLOGY ROADMAP (TRM) FOR SUSTAINABLE HOUSING IN CANADA

Canada Mortgage and Housing Corporation (CMHC), in partnership with Industry Canada (IC) and Natural Resources Canada (NRCan), will support the development of a Technology Roadmap (TRM) for Sustainable Housing. The TRM will be used to focus industry and government resources on realizing opportunities for, and addressing challenges to, sustainable housing. The TRM will be developed through industry consultations and the organization of industry working groups that will identify key areas of work and possible pathways forward. The TRM will be completed in 2009.

CMHC Project Officer : *Duncan Hill* ***CIDN*** : 37670200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SUSTAINABLE BUILDING ENVELOPE RETROFITS FOR EXISTING HOUSES

This project will develop fact sheets on energy and cost-effective strategies to improve the performance of the building envelopes of existing houses and increase awareness of the cost and environmental impacts of these improvements. They will include generic information about materials and components used in building envelopes, and detailed information about installation and connection of materials and components to ensure optimal performance. The fact sheets will illustrate different strategies to improve walls, foundations, openings and penetrations and compare the estimated costs and energy savings of each. Best practice details (from CMHC guides) will illustrate and explain critical construction procedures and concerns. The fact sheets will contain references to useful information and services, such as CMHC publications and the ecoENERGY program. They will contain information about recycling and disposal of construction materials and their effects on the environment. and will increase the reader's awareness of the environmental impact of changes to their houses, and the ways to achieve the best energy efficiency and durability for the least expense. A consultant with substantial knowledge of Canadian wood-frame construction and sustainable housing will be engaged to review literature on the subject and adapt CMHC best practices to address energy efficient building envelope retrofits.

CMHC Project Officer : *Barry Craig* ***CIDN*** : 38340200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available ***NEW***

SUSTAINABLE DEVELOPMENT & HEALTHY HOUSING

TAP THE SUN: REVISION AND UPDATE

CMHC's new, updated "Tap the Sun" publication provides information on solar design for Canadian homes. It builds upon the earlier version and this will help to ensure that the publication continues to be one of the premier passive solar design resources available to consumers and the residential construction industry. The revised publication contains new information on the Integrated Design Process (IDP) as an essential step in the delivery of passive solar designs. The new "Tap the Sun" has been restructured to allow potential users to read the entire book or to go to sections for comprehensive information on specific subjects. This approach allows relatively uninformed readers to learn about passive solar design strategies and provides sufficient knowledge to allow for the participation in a design of a passive solar house. The publication contains updated design data, envelope information particularly with respect to new window technologies, and the latest developments in solar thermal systems and photovoltaics, well detailed case study projects, new references to occupant health and comfort, mechanical and electrical systems and identified key resources. A companion CD includes improvements/updates to the integrated tools such as the Comfort Design Checker. The publication is under final internal review.

CMHC Project Officer : *Woytek Kujawski* ***CIDN*** : 25450200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

See also: Socio-economic research on Sustainable Development & Healthy Housing, p. 77
FINANCE MECHANISMS IN SUPPORT OF SUSTAINABLE HOUSING, p. 62

WATER CONSERVATION, REUSE & MANAGEMENT

ALTERNATIVE STORMWATER MANAGEMENT - WATERSHED RESTORATION

This work will see the development of a number of integrated stormwater planning, design and management tools for builders, developers, and municipal staff. These tools will assist in smart urban development by providing a means for assessing watershed health and prioritizing areas for restoration thereby allowing stakeholders to make informed choices on urban development and stormwater management. The ecologically engineered storm water management tools presented here will improve stormwater drainage systems, improve water quality and reduce the negative impact of stormwater infrastructure on the environment by utilizing an ecological system that has a greater resilience to drought and flooding in the face of climatic changes. The first of two reports are now completed and available through CHIC documenting 5 case studies of innovative stormwater management.

CMHC Project Officer : *Catherine Soroczan* ***CIDN*** : 33880200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is available

DO PRESSURIZED AT-GRADE ON-SITE SEWAGE SYSTEMS PROVIDE QUALITY TREATMENT COMPATIBLE WITH THE LANDSCAPE?

At-grade wastewater treatment systems are currently approved for use in Alberta. However, recent research indicates that full sewage treatment does not always occur. This External Research Program study will examine 2-3 installed systems and assess the performance efficiency of an altered distribution pattern. Parameters to be measured include moisture content, bacterial counts, and nutrient content changes in the soil layer to which effluent has been applied.

CMHC Project Officer : *Catherine Soroczan* ***CIDN*** : 28920209
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

EVALUATION OF WATER CONSERVATION PRACTICES

This research will provide municipalities with guidance in creating a cost effective water efficiency plan (WEP). The use of a standardized WEP will allow for practical and useful comparisons between water efficiency programs implemented across Canada. A template WEP will be developed to incorporate the variety of necessary parameters to be considered such as water source, population size and growth, regional socio-economic, climatic and geographic conditions, infrastructure status, target changes in water demands and wastewater flows, projected capital works and related costs, and cost/benefit. The WEP template will include a software database for creating a water efficiency plan plus a report documenting the key components of water efficient planning.

CMHC Project Officer : *Catherine Soroczan* ***CIDN*** : 30550200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

INNOVATIVE RESIDENTIAL STORMWATER MANAGEMENT FOR SUSTAINABLE HOUSING AND COMMUNITIES

CMHC is supporting the development of strategies, policies, case studies and tools to support innovative residential stormwater management in Canada. This multi-party partnership includes the Canadian Water Network, Environment Canada, and various academic institutions and municipalities across Canada. Information developed by this project will be available through CMHC research reports and studies. To date workshops in Vancouver, Calgary, and Toronto have been held, attracting participants from government, academia, community groups, developers and consultants. The proceedings will be made available through the Water Quality Research Journal of Canada which will be available for loan from the Canadian Housing Information Centre.

CMHC Project Officer : *Catherine Soroczan* ***CIDN*** : 36420200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

NATURE'S REVENUE STREAMS: FIVE ECOLOGICAL VALUE CASE STUDIES

This study examines five projects that have applied nature's principles in the design of stormwater management facilities and compared their overall value to that of the traditional "pipe and drain" approaches. Focussed largely on stormwater, but with broader attributes, the question raised was whether the projects have tangible economic value, savings or other benefits either to the developer, the occupant, the community, or the municipality.

The five case studies examined are all located within the Colquitz River watershed in Saanich, British Columbia. They are:

1) the relocation and restoration of Blenkinsop Creek on the Galey Farm;
2) Swan Creek restoration and wetland construction within the Willowbrook Subdivision;
3) stream restoration within the South Valley Subdivision;
4) Wetland construction adjacent the Rogers Farm Subdivision; and
5) permeable paving and swale/wetland construction at the Vancouver Island Technology Park.

Aqua-Tex Scientific Consulting Ltd. and their associates completed these projects within the space of a few years between 2000 and 2002. These projects included farmland, residential and institutional development projects that implemented innovative stormwater management practices, and creek and wetland restoration initiatives, as incremental parts of the watershed's gradual restoration.

This report sought to compare the costs associated with traditional stormwater infrastructure solutions to the costs of ecologically engineered alternative stormwater management. Furthermore, this study sought to identify and quantify additional use and non-use benefits that can be derived when ecological infrastructure is applied to manage stormwater.

Prepared by Aqua-Tex Scientific Consulting Ltd; Cori L. Baraclough, Daniel A. Hegg and contributors. Sponsored by Canada Mortgage and Housing Corporation and the Federation of Canadian Municipalities through a grant to the Corporation of the District of Saanich. CMHC Project Officer: Cate Soroczan. Ottawa: Canada Mortgage and Housing Corporation, 2008. 101 pages (5688 KB)

STATUS : New Completed Report

AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Nature's%20Revenue_web.pdf

NEXT GENERATION WATER BALANCE MODEL

CMHC has supported the development of the Water Balance Model - an on-line decision support tool to evaluate the impact of land use planning and site design on stormwater runoff and watershed health. This project will review the newly updated Water Balance Model tool and then field test it on the Don Valley Watershed in order to determine its effectiveness as a modelling tool, its reporting capabilities, and general ease-of-use. Separate work will be undertaken to incorporate a module to account for onsite water reuse.

CMHC Project Officer : *Catherine Soroczan* ***CIDN*** : 38400200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available ***NEW***

RAINWATER HARVESTING - DEMONSTRATIONS

CMHC is supporting innovative projects with the Cities of Toronto and Guelph to advance rainwater harvesting technologies and strategies in the Canadian residential sector. A rainwater harvesting system for toilets and irrigation will be incorporated and monitored in a high-rise multi-unit residential building in downtown Toronto. A multi-goal project with the University of Guelph will serve to pilot rainwater harvesting applications for indoor and outdoor residential use while addressing technical and regulatory issues related to design, certification, approvals and performance. Information from Canadian and international examples regarding code issues, plumbing issues, technology design and performance issues will be adapted. The Cities of Toronto and Guelph are supporting the projects by working to remove any municipal obstacles that may prevent the use of rainwater harvesting. Results from this work will be used to promote and increase awareness regarding the feasibility of rainwater harvesting for onsite water reuse particularly for large scale residential developments.

CMHC Project Officer : *Catherine Soroczan* ***CIDN*** : 33190200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SLOPING SAND FILTERS FOR ON-SITE WASTEWATER TREATMENT

The overall objective of this External Research Project Grant is to develop and test design guidelines for Sloping Sand Filter (SSF) systems which maximize treatment performance while minimizing construction costs. The hydraulic characteristics and treatment performance of SSFs operated at different loading rates will be assessed within this study. These field studies will supply the data needed to calibrate and test a SSF hydraulic model. The model, once tested, will be used to develop and refine design guidelines for SSF systems.

CMHC Project Officer : *Catherine Soroczan* ***CIDN*** : 34380205
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SMALL COMMUNITY WASTEWATER TREATMENT OPTIONS

Wastewater servicing is an issue of increasing importance to society, in particular small communities across Canada. Typically communities with wastewater problems are given two options, on-site wastewater treatment or centralized sewer systems. The Ottawa Septic System Office (OSSO) believes that small communities do not have access to enough unbiased information when making servicing decisions. The OSSO will identify several wastewater options for communities with an average daily wastewater flow of < 50,000 L/d . The proposed research will focus on wastewater treatment options utilizing subsurface disposal. The research will examine multiple wastewater servicing options and solutions to associated problems. Efforts will be concentrated on existing approved technologies as well as innovative and emerging technologies. Work is currently underway to analyse data gathered from a literature review and a survey to municipalities on on-site wastewater issues.

CMHC Project Officer : *Catherine Soroczan* ***CIDN*** : 36260204
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SUPPORT FOR NATIONAL ON-SITE WASTEWATER RESEARCH PROGRAM

CMHC in conjunction with the Canadian Water and Wastewater Association and the provincial on-site associations of Ontario, Alberta, and B.C. will work with national stakeholders across the country to address research and policy gaps in the area of decentralized wastewater management. The network will identify and prioritize all research and policy issues, and leverage funding to address these issues and communicate the results across the country. As a starting point, CMHC will support targeted research for the development of on-site wastewater technology verification and installation standards. To date CMHC has supported the Bureau du normalisation du Québec in the development of a national standard for on-site wastewater technology verification. The draft national standard underwent a public review in spring 2008. Revisions have been incorporated based on this review and the standard may be available by June 2009. A second initiative will support the development of a national on-site wastewater installation standard through the Canadian Standards Association.

CMHC Project Officer : *Catherine Soroczan* ***CIDN*** : 35720200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SUPPORT FOR THE CREATION OF A NATIONAL WATER REUSE PROGRAM

CMHC will work with stakeholders from various government levels, associations, private industry and research centres to establish a Canadian national residential water reuse research and development program of work. This program will address gaps including: policy needs, risk analysis, design standards, pricing strategies, technology performance criteria, enhanced pilot testing and technology demonstration, national guidelines and regulations and innovative technology support for export to developed markets. The first project under this program has been the development of a draft national water reuse guideline for toilet application. The final draft was posted for public enquiry in January 2008 and comments are now being incorporated into the final version. The guideline is anticipated to be finalized and available December 2009.

CMHC Project Officer : *Catherine Soroczan* ***CIDN*** : 35730200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

WETLAND WASTEWATER TREATMENT FOR ISOLATED DWELLINGS

This project will evaluate the performance of two wetland treatment systems in reducing wastewater contaminants from isolated dwellings including the effects of freeze thaw on operation and performance. A pilot hybrid wetland will be built at the Ontario Rural Wastewater Centre. The Centre has also built a pilot septage reed bed filter system in Eastern Ontario. The project will consider hydraulic and organic loading rates of septage and holding tank wastes and the impacts of the vegetation on treatment as well as climatic effects (precipitation, temperature).

CMHC Project Officer : *Catherine Soroczan* ***CIDN*** : 38420200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

See also: STORMWATER MANAGEMENT CASE STUDIES, p. 72

SOCIO ECONOMIC RESEARCH

ABORIGINAL HOUSEHOLD, HOUSING AND COMMUNITY CONDITIONS BASED ON THE 2001 ABORIGINAL PEOPLE'S SURVEY (APS) AND ABORIGINAL CHILDREN'S SURVEY

This study will profile housing and social conditions of Aboriginal people by distinct Aboriginal group (Status Indian, Métis, Inuit, and non-status Indian), looking at conditions on reserves and outside reserves. The research will examine relationships between housing conditions, household characteristics, and other socio-economic factors, including health status, education, labour activity, and income. Various indicators of housing conditions that are available through the APS and Census will be explored, including crowding, need for repair, water quality, features present in or absent from the home, and core housing need. Personal and household characteristics to be investigated include age, gender, education, disability status, mobility, and household type. Specific analyses will examine the relationship between educational performance of Aboriginal children and their housing conditions and the relationship of health to housing conditions.

CMHC Project Officer : *Candace A Fedoruk* ***CIDN*** : 3576 0200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

CASE STUDIES OF THE CRITICAL PRECONDITIONS FOR ACHIEVING MARKET-BASED APPROACHES TO HOUSING IN FIRST NATION COMMUNITIES

This project consists of eight case studies of First Nation communities that have an established housing system with market characteristics. The studies will identify for each community the necessary and sufficient condition that enabled the market-like system to be implemented or to evolve. The findings from each community will be compared with each other to highlight commonalities and unique solutions and will also be discussed in the light of certain homeownership initiatives on tribal trust lands in the US.

CMHC Project Officer : *Antoine Pomerleau* ***CIDN*** : 36800200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

GUIDE TO CITY HOUSING FOR ABORIGINAL PEOPLE

This product will provide Aboriginal people with practical information concerning how to obtain housing in urban centres. The publication will be a guide for those relocating from small rural and remote communities and also for those in urban centres who need further information concerning housing and homeownership.

CMHC Project Officer : *Ian Melzer* ***CIDN*** : 34130200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

HOW ECONOMIC DEVELOPMENT OPPORTUNITIES CAN BE LINKED TO ABORIGINAL HOUSING

The research will explore how economic development opportunities can be linked to housing in First Nation communities and to Aboriginal housing outside reserves. The research will include eight case studies to examine successful approaches implemented and lessons learned by First Nation communities and Aboriginal housing service providers or organizations in linking economic development opportunities to housing on reserve. The research will make recommendations on approaches to foster linkages between economic development and housing that is appropriate to First Nation communities and Aboriginal organizations. The research will also identify research challenges and suggestions for future research based on past and current research findings. The final report, expected at the end of 2009, will be of interest to First Nation communities, Aboriginal organizations, and federal program and policy officials.

CMHC Project Officer : *Michel Blondin* ***CIDN*** : 36840200

Division : Policy and Research Division ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

MONITORING THE PERFORMANCE OF THE SEABIRD ISLAND PROJECT

A research project was initiated to assess various aspects of the performance of the Seabird Island Project. The Seabird Island project provided an opportunity to assess innovative design and construction features in terms of their impact on the performance of the project. Overall, the Seabird Island First Nation community is pleased with the homes constructed and their performance. Based on the results of the monitoring project, general recommendations for future efforts to enhance the environmental sustainability of housing include the need to keep systems simple, easy to understand and easy to control. A number of the strategies employed at Seabird Island were unnecessarily complex in design, difficult to construct and will be hard for the occupants to maintain.

STATUS : New Completed Research Highlight

AVAILABILITY : Note: No. 09-101 in the Research Highlights Technical Series summarizes the results of this research and is available on the CMHC web site (Order number 66373)

SMALL FOOTPRINTS ON UNBROKEN LAND / HEALING BROKEN LAND

The project will contribute professional advice and services towards a new First Nation development project located on wild unbroken land in coastal BC and / or on previously used industrial or agricultural broken land. Starting with planning workshops and the development of a community plan, then moving towards establishing a renewable energy platform based on a business plan that establishes a continuous revenue stream, a sustainable development strategy and design solution will be produced for housing construction under Section 95 funding and other recently announced programs to produce 150± homes over 5 years. This will be combined with infrastructure funding from Indian and Northern Affairs Canada, Western Economic Diversification Canada, Natural Resources Canada and Human Resources and Social Development Canada. This project will produce a practical demonstration of sustainable planning, design and development models for rural and remote communities elsewhere in Canada. Fully planned and developed communities, complete with renewable energy systems, road, water, waste water and other essential infrastructure, will occur in several First Nation locations. Development models will be produced that encourage incorporation of sustainability principles and that are built upon economic development and capacity building. The ultimate outcome is 100-150 new homes built by community members in a community planned by the community through workshops and design charrettes.

CMHC Project Officer : *Allan Dobie* ***CIDN*** : 35290200

Division : Policy and Research Division ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

ABORIGINAL HOUSING

SUSTAINABLE HOUSING IN THE NORTH

The objective of this research was to produce a user-friendly plain language research report that provides a background of "northern" (North of 60) housing in Canada, identifies the types of challenges encountered in northern housing in Aboriginal (Inuit, First Nations, Métis) communities and provides best practice examples of sustainable housing (durable, affordable in construction through use of local materials when possible and in maintenance through provision of energy, water and waste water management at a manageable cost). In addition, the report examined sustainable housing components that have proven to be successful in Canada, and in northern countries that have geographic, climatic and resource challenges similar to those in northern Canada and which may be used, or adapted for use, in Canada. The project is ongoing.

CMHC Project Officer : *William Semple* ***CIDN*** : 32740200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

See also: RETROFITTING CRAWL SPACES - FIRST NATIONS DEMONSTRATION, p. 9
A MODEL FOR SUSTAINABLE FIRST NATIONS NORTHERN HOUSING AND COMMUNITIES, p. 36

CHILDREN S ENVIRONMENTS

HOUSING, NEIGHBOURHOODS AND CANADIAN CHILDREN'S HEALTH OUTCOMES

This External Research Project will use Cycles 1 to 5 of the National Longitudinal Survey of Children and Youth (NLSCY) to examine whether and how much a family's housing choices (owned home, unassisted rental, assisted housing; single family, row housing, etc.) affect child health outcomes. The research will seek to identify which housing and neighbourhood characteristics associated with home ownership, rental, assisted housing and/or type of housing have impacts on health outcomes, and which do not, and how these characteristics interact with housing choices to affect child health outcomes.

CMHC Project Officer : *Mark Holzman* ***CIDN*** : 36260205
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

ROLE OF AFFORDABLE HOUSING IN THE WELL-BEING OF CHILDREN: AN EXPLORATORY LONGITUDINAL STUDY

The purpose of this External Research Program study is to develop a feasible and methodologically rigorous longitudinal research strategy that will be used to conduct a multi-city study to understand how the receipt of affordable rental or home ownership housing through the Affordable Housing Program impacts children's development and well-being. The second objective is to pre-test the developed research strategy by conducting a small-scale pilot study. The findings from the pilot will provide useful preliminary data on the impact of affordable housing on the well-being of children, particularly outcomes related to educational attainment. The findings will also be used to further refine the developed research methodology.

CMHC Project Officer : *Derek McCall* ***CIDN*** : 38840202
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

ACHIEVING SMART GROWTH IN BRITISH COLUMBIA = PARVENIR À UNE CROISSANCE INTELLIGENTE EN COLOMBIE-BRITANNIQUE. AFFORDABILITY AND CHOICE TODAY ACT CASE STUDY = ABORDABILITÉ ET CHOIX TOUJOURS (ACT) ÉTUDE DE CAS

Many municipalities support "smart growth", a concept embodying planning and development practices intended to enhance a community's quality of life while preserving and benefiting the surrounding environment. Smaller municipalities, however, tend to lack the staff, the financial resources or the regulatory capacity to implement smart growth principles.

With the support of a multi-disciplinary group of professionals, West Coast Environmental Law (WCEL) developed a Smart Bylaws Guide to assist municipalities in adopting smart development practices. The Guide explains the rationale for smart growth reforms, details how to streamline approvals, documents examples (including bylaws) of smart growth practices and provides a municipal checklist for evaluating the quality of development proposals. WCEL received ACT funding to use in demonstrating the application of the Guide with four municipalities: City of Prince George, the Town of Oliver, the District of Central Saanich and the District of Pitt Meadows.

This report provides an overview of the ACT case study, including the project description, the project results, a description of the communities and key players.

Case study written by = Étude de cas rédigée par : Word-Works Communications Services. Ottawa: Federation of Canadian Municipalities, Canadian Home Builders' Association, Canadian Housing and Renewal Association, Canada Mortgage and Housing Corporation = Fédération canadienne des municipalités, Association canadienne des constructeurs d'habitations, Association canadienne d'habitation et de rénovation urbaine, Société canadienne d'hypothèques et de logement, 2006. 14, 16 pages (Order number 65648)

STATUS : New Completed Report
AVAILABILITY : Canadian Housing Information Centre

COMPARING CANADIAN NEW-URBANIST AND CONVENTIONAL SUBURBAN NEIGHBOURHOODS

This study will gather and compare data from new-urbanist developments and conventional suburban developments to determine if key objectives of these developments have been realized. Variables to be examined include: car usage for weekday urban travel; access to daily destinations; pedestrian connectivity; housing choice; compactness; occupant satisfaction (e.g. pedestrian safety, aesthetic qualities); access to useful public open/green space; and interaction. The study will derive lessons learned about various neighbourhood design features and how well they achieve key objectives. Four new-urbanist developments and four comparable conventional suburban developments have been chosen and surveyed, and an interim report has been submitted and reviewed. Data analysis is complete and the draft final report has been submitted and reviewed and the final report will be completed in 2009.

CMHC Project Officer : *Susan Fisher*
CIDN : 30610200
Division : Policy and Research Division
STATUS : Ongoing
AVAILABILITY : Product is not yet available

CONTAMINATED LANDS

BROWNFIELD REDEVELOPMENT FOR HOUSING - CASE STUDIES

This research will profile the best practices and lessons learned from projects and initiatives that have resulted in residential redevelopment on brownfield or contaminated sites. The case studies will compliment CMHC's existing database of brownfield redevelopment case studies. Examples will be drawn from across the country. Each case study will include aspects of land use planning and regulatory approvals, project financing and marketing, design and construction, environmental remediation, liability and financing, and relevant special circumstances. The results will be of interest to municipalities who wish to encourage and support brownfield redevelopment for housing, and those who are involved in the redevelopment of brownfields for residential purposes.

CMHC Project Officer : *Cynthia Rattle* ***CIDN*** : 35300200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

NATIONAL REVIEW - ENVIRONMENTAL REGULATORY SCAN FOR CONTAMINATED LANDS

The purpose of this project is to outline the pertinent regulatory requirements related to brownfield redevelopment for housing in Canada, including but not limited to multi-unit, rental residential projects. An inventory of regulatory requirements will be prepared and the regulatory requirements will be compared across jurisdictions. Recent and anticipated changes to the requirements will be identified. Content for informational resources will be developed, to assist those pursuing or involved in brownfield redevelopment for housing. The research will provide those involved in brownfield redevelopment for housing with information regarding the relevant regulatory requirements in each jurisdiction and any upcoming or proposed regulatory changes.

CMHC Project Officer : *Cynthia Rattle* ***CIDN*** : 36190200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

COOPERATIVE AND NON-PROFIT HOUSING

GOVERNANCE CHALLENGES OF HOUSING NON-PROFIT ORGANIZATIONS

The objective of this research is to gain a better understanding of the organizational and operational challenges (such as: financing, partnerships, aging of tenants, interfaces with the health sector, maintenance of aging buildings, and succession of directors) facing the directors, managers, and others who are involved in the governance of non-profit housing organizations in Quebec.

CMHC Project Officer : *Hoda Shawki* ***CIDN*** : 38840204
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

COOPERATIVE AND NON-PROFIT HOUSING

SUSTAINING THE NON-PROFIT SECTOR IN BRITISH COLUMBIA, PHASE II

The Sustaining the Non-Profit Housing Sector in B.C., Phase II project will provide a range of workable solutions to the concerns identified by non-profit housing providers in Phase I of the study and which have to do with:

i) expanding the sharing of services/resources and extending bulk purchase opportunities;

ii) attracting, training and managing volunteers more effectively; and

iii) increasing the scale and professionalism of fund raising.

The goal of this project is to develop options which effectively address each of the problem areas and are flexible enough to appeal to housing societies with a broad range of management styles, geographic locations and operational priorities.

CMHC Project Officer : *Stephen G Hall* ***CIDN*** : 34240200

Division : Policy and Research Division ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

HOUSING

EXAMINATION OF THE BOUNDARIES BETWEEN HOUSING AND INCOME SECURITY POLICY

The result of this study will increase awareness of the importance of housing in respect to broader social policy and income support policy in particular. This will contribute to the work of the Federal-Provincial-Territorial working group on affordable market housing, and potentially to other exercises such as the development of a market basket for measuring poverty and the design of future income support policy (e.g. National Child Benefit). This study will compare the housing and income support systems in four countries (Canada, United States, United Kingdom and Australia). It will focus on the structure of housing.

CMHC Project Officer : *Brian Davidson* ***CIDN*** : 30140200

Division : Policy and Research Division ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

FAMILY WELL-BEING, COMMUNITIES AND HOUSING

This External Research Program project will examine family housing need, family well-being and the municipal response. Through this research it will be possible to get a better sense of the extent to which policies related to housing and family well-being are "on the radar" of local governments and to identify the range of strategies and initiatives that municipal governments have put in place to respond.

CMHC Project Officer : *Brian Davidson* ***CIDN*** : 36260212

Division : External Research Program ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

ACTION RESEARCH ON TRANSPORTATION AND HOUSING AFFORDABILITY

The question driving this External Research Program project is what is the potential for increasing housing choice and affordability in large Canadian cities through the application of sustainable transportation policy? The main goal of the research is to identify municipal transportation policies with the potential for the most positive impact on housing choice and affordability.

CMHC Project Officer : *Mark Holzman*
Division : External Research Program
AVAILABILITY : Product is not yet available

CIDN : 38840209
STATUS : Ongoing

AFFORDABLE HOUSING FOR FAMILIES: ASSESSING THE OUTCOMES

Families who cannot access affordable housing not only face increased housing pressure, but also many other social and economic problems, and risk homelessness. Yet there are currently no new programs in BC for affordable housing for families. This External Research Program project aims to produce important information on outcomes for families in affordable housing for input to policy-making.

CMHC Project Officer : *Ed Nera*
Division : External Research Program
AVAILABILITY : Product is not yet available

CIDN : 34380214
STATUS : Ongoing

HOUSING AFFORDABILITY TRENDS 1981-2001: AN ANALYSIS OF SELECTED METROPOLITAN AREAS IN CANADA

Although incomes rose and income inequality on many measures was stable between 1981-2001, housing affordability was a problem for many Canadian households. This research highlight examined the issue of worsening housing affordability during this 20-year period and found that a significant percentage of Canadian households fell below the affordability standard (i.e. they paid 30% or more of income for shelter), that economic cycles in the country at large affected affordability levels on the income side, and that shelter costs increased.

Prepared by Paddy Fuller. CMHC Project Officer: Jeremiah Prentice. Ottawa: Canada Mortgage and Housing Corporation, 2008. 68 pages (5829 KB) (External Research Program Report)

Note: No. 09-003 in the Research Highlights Socio-economic Series summarizes the results of this research and is available on the CMHC web site (Order number 66381)

STATUS : New Completed Report and Research Highlight
AVAILABILITY : Canadian Housing Information Centre and
ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/08h50(w).pdf

HOUSING AFFORDABILITY

RECYCLING CATHOLIC CONVENTS AND RELIGIOUS INSTITUTIONAL BUILDINGS INTO AFFORDABLE AND ALTERNATIVE HOUSING: THREE CASE STUDIES

This project under the External Research Program will examine the recycling of religious institutional buildings in Quebec City into housing. An inventory of buildings that have been converted will be prepared and three case studies will be analyzed. Interviews will be conducted with the architects, municipal planners, occupants of the buildings and members of the religious order to assess the success of the housing project. Recommendations will be provided for future conversions of similar buildings. A final report has been completed and will be published along with a Research Highlight in 2009.

CMHC Project Officer : *Susan Fisher* ***CIDN*** : 26470205
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

RENEWAL OF AFFORDABILITY & CHOICE TODAY (ACT) (2008-09 TO 2009-10)

The Affordability and Choice Today (ACT) initiative has been renewed for 2 years. ACT provides grants of up to $5,000 to local teams of municipalities and housing stakeholders, who promote the improvement of planning and building regulations in their communities to enable housing affordability and a broader range of housing options. ACT also offers a wealth of proven best practices and lessons learned so that communities can benefit from the innovations of others.

CMHC Project Officer : *Susan Fisher* ***CIDN*** : 06290212
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available ***NEW***

HOUSING AND IMMIGRATION

EXPANDING HOUSING CHOICES FOR NEW CANADIANS

This project gathered and presented detailed information for immigrants, and those assisting their settlement in Canada, on housing availability and housing costs for the cities of Vancouver, Toronto and Montreal, as well as a few other smaller municipalities. Since housing availability and costs vary considerably among Canadian municipalities, the guide also provides some general, basic information regarding housing cost for a broader list of municipalities. The goal of the project was to help immigrants choose alternatives other than settling in the larger cities, help them find housing in municipalities with lower housing costs, and help smaller municipalities attract immigrants to settle within their communities by showcasing their assets and their strengths, and support community development.

The results of the project are available on the CMHC web site under the title "Settling in Canada". This practical guide is designed to help newcomers to Canada find a city they can call home. It includes profiles and comparisons of 11 different Canadian cities, as well as housing, employment and settlement related resources.

STATUS : Completed
AVAILABILITY : Product is available on the web

MOBILITY EXPERIENCES OF IMMIGRANTS AND THE CANADIAN BORN AND HOMEOWNERSHIP

This External Research Program project aims to answer two key research questions. First, do immigrants relocate in Canada more than the Canadian born and if so, at what geographic levels? Second, among immigrants and the Canadian born who relocate, for whom is it more likely to end in homeownership?

CMHC Project Officer : *Jim Zamprelli* ***CIDN*** : 38840210
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

REVIEW OF CMHC'S NEWCOMER'S GUIDE TO HOUSING

This is a review with stakeholders to identify ways of increasing the usefulness and impact of CMHC's Newcomer's Guide to Housing.

CMHC Project Officer : *Jim Zamprelli* ***CIDN*** : 36900200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Research highlight is not yet available

SETTLING IN: NEWCOMERS IN THE CANADIAN HOUSING MARKET, 2001-2005

This study updates previous work that examined data from the first wave of Statistic Canada's Longitudinal Survey of Immigrants to Canada (LSIC) in conjunction with special tabulations from the 2001 Census. That study found that the degree of homeownership attained by immigrants just six months after landing in Canada was impressive. This study examines the following issues using data from the three waves of the LSIC:

- Is there evidence that newcomers to Canada build on this initial success to create a progressive housing career?
- Which groups are experiencing a greater degree of progression in their housing situation, and which groups are not?
- Are there systematic differences between European-origin and visible minority immigrants in the housing market?
- If so, are these consistent across Canada or specific to certain places, especially the three largest immigrant reception centres of Montréal, Toronto and Vancouver?
- How much do the housing careers of immigrants landing in these three cities differ?

Prepared by Daniel Hiebert and Pablo Mendez. CMHC Project Officer: Jim Zamprelli. Ottawa: Canada Mortgage and Housing Corporation, 2008. 81 pages (981 KB) (External Research Program Report)

Note: No. 09-002 in the Research Highlights Socio-economic Series summarizes the results of this research and is available on the CMHC web site (Order number 66387)

STATUS : New Completed Report and Research Highlight
AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Setting%20In%20(w)_feb19.pdf

CANADIAN OFFER AND CAPACITY IN GREEN BUILDING PRODUCTS AND SUSTAINABLE SOLUTIONS

The demand in green building products is increasing in the United States, Canada's most important trade partner as well as in other priority markets where CMHC International is helping Canadian exporters. This market trend is leading to new business opportunities for Canadian exportations. As a facilitating body of Canadian exportations, CMHC International has identified the need for an overview of the Canadian offer and capacity in the field of green building products in order to identify players and position the Canadian offer in foreign markets.

CMHC Project Officer : *Terry Robinson*
Division : CMHC International
AVAILABILITY : Product is not yet available

CIDN : 37690900
STATUS : Ongoing
NEW

CASE STUDY FOR THE INTEGRATION OF TECHNICAL, REGULATORY AND COMMERCIAL, SUPPORT FOR HEAT RECOVERY VENTILATORS IN THE UK/IRELAND MARKETS

This project seeks to improve the Canadian heat recovery ventilator (HRV) industry's understanding of the technical, regulatory and commercial challenges to UK/Ireland market penetration and expansion. It will endeavor to increase the number of Canadian HRV manufacturers in possession of U.K. and/or EU regulatory approvals, which will lead to increased sales of Canadian HRVs to the U.K/Ireland and increased Canadian content of Super E housing system exports.

CMHC Project Officer : *Terry Robinson*
Division : CMHC International
AVAILABILITY : Product is not yet available

CIDN : 38780900
STATUS : Ongoing
NEW

COMPETITIVE COST AND PERFORMANCE STUDY IN FRANCE

The purpose of this project is to conduct a study on building costs, energy consumption and acoustic properties comparing traditional French construction to Canadian wood-frame technology. The goal is to compare the R-2000/Super-E standards to standards used in France, including future standards like RT-2005/RT-2010, and to analyse total costs attached to the Canadian housing system compared with traditional construction and other wood construction available in France. The costs will include building costs, energy costs, transportation costs and other costs to arrive at a global perspective. If possible, comparisons with standards used in other French speaking countries will be added. The project outcome will be a study report and a specification sheet for a typical Canadian housing system to be used by CMHC and Canadian manufacturers.

CMHC Project Officer : *Guy Lemieux*
Division : CMHC International
AVAILABILITY : Product is not yet available

CIDN : 37040900
STATUS : Ongoing

DISTRIBUTION AND BUILDER RESEARCH IN SELECTED U.S. MARKETS

The project will study distribution channels and builder buying preferences for specific products in some areas of the United States. The focus for this project will be Middle Atlantic and South Atlantic regions of the U.S. Other areas could also be included in the study. Distribution for the following products will be examined: insulation, solar panel, high-end roofing, and windows. Builder buying preferences will be studied for staircase and millwork. The project outcome will be market intelligence reports for specific building products and U.S. Regions.

CMHC Project Officer : *Sanjar Farzaneh* — ***CIDN*** : 37030900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

FEASIBILITY STUDY ON ONTARIO WOOD PRODUCTS EXPORT ASSOCIATION

This project consists of a feasibility study on the creation of an export association for wood products in Ontario. The results of the study will be disseminated among interested stakeholders.

CMHC Project Officer : *Sanjar Farzaneh* — ***CIDN*** : 36150900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

FOLLOW-UP TO 2006 MARKET RESEARCH ON HARDWOOD FLOORING & ENGINEERED WOOD FLOORING IN THE UK

Based on a 2006 market study of hardwood and engineered wood flooring products to the United Kingdom, the purpose of this project is to conduct more focused research for Canadian companies on the commercial opportunities raised in the report based on their specific needs in order to increase their export sales.

CMHC Project Officer : *Terry Robinson* — ***CIDN*** : 36340900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

HOUSING MARKET ASSESSMENT IN CENTRAL AMERICA AND THE CARIBBEAN

The purpose of this project is to provide an assessment of the housing market in Central America and the Caribbean (strengths and weaknesses) in order to explore potential business opportunities for Canadian housing and finance industry participation in those regions.

CMHC Project Officer : *Terry Robinson* — ***CIDN*** : 37920900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available — ***NEW***

MARKET DEVELOPMENT IN FRANCE FOR THE CANADIAN HOUSING INDUSTRY

The project has two primary objectives: act as a local resource for CMHC to provide concrete assistance in view of achieving its development objectives on the French housing market, and identify and develop business opportunities and contacts in France for Canadian housing systems and components manufacturers in general.

CMHC Project Officer : *Guy Lemieux* — ***CIDN*** : 37080900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

MARKET INTELLIGENCE ON NEW ENGLAND HOUSING MARKET

CMHC will support Canadian manufacturers with updated market information and intelligence on the Maine housing market by conducting market research specifically on (1) market needs for products that meet the LEED requirements; (2) trends and preferences including product specifications; and (3) changes in relation to NAFTA and cross-border issues. Market information on Maine will be disseminated to Canadian companies.

CMHC Project Officer : *Ronald Drisdelle* — ***CIDN*** : 38490900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

MARKET OPPORTUNITIES WITH MEXICAN HIGH-END BUILDERS

The project will provide information on housing projects and their contacts in different Mexican cities. It will also identity opportunities in the Mexican distribution channels for high-end products. Project outcome: Market intelligence reports, greater integration of Canadian products/systems in the high-end segment.

CMHC Project Officer : *Paulina Barnes* — ***CIDN*** : 37090900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

OVERVIEW OF CANADIAN EXPORT POTENTIAL IN THE RESIDENTIAL HIGH-RISE SECTOR

The study will provide an overview of Canadian strengths in the residential high-rise sector and report on areas where Canadian companies have a technological or an expertise advantage in foreign markets.

CMHC Project Officer : *Guy Lemieux* — ***CIDN*** : 36270900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

REGULATORY SUPPORT FOR WINDOWS IN THE U.K./IRELAND

This project seeks to improve the Canadian wood window industry's understanding of the technical, regulatory and commercial challenges to UK market penetration and expansion. It will endeavor to increase the number of Canadian window manufacturers in possession of U.K. and/or EU regulatory approvals, which will lead to increased sales of Canadian windows to the U.K. and increased Canadian content of Super E housing system exports.

CMHC Project Officer : *Terry Robinson* — ***CIDN*** : 38740900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available — ***NEW***

RESEARCH BUSINESS OPPORTUNITIES IN CHINA

This project will consist of identifying and documenting business opportunities in China and matching them with Canadian manufacturers. This project will also be funded by Canadian manufacturers participating in the program. A report will be produced on the results of the program.

CMHC Project Officer : *Tulio Conejeros* — ***CIDN*** : 37070900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

RESEARCH ON EMERGING MARKETS

The purpose of this project is to report on emerging markets in the Gulf Co-operation Council, Middle East that offer potential export opportunities for Canadian product manufacturers and service providers.

CMHC Project Officer : *Brian Eames* — ***CIDN*** : 37060900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

RESEARCH ON THE RELATIONSHIPS BETWEEN U.S. BUYERS AND CANADIAN SELLERS

The purpose of this project is to gather market intelligence on U.S. buyers of green building products that will help Canadian manufacturers identify and gain market access, and promote awareness and acceptance of Canadian green building products.

CMHC Project Officer : *Terry Robinson* — ***CIDN*** : 38570900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available — ***NEW***

TRANSPORT CO2 EMISSIONS ESTIMATOR FOR FRANCE

This project will estimate the amount of energy required and the green gas emissions produced from shipping Canadian prefabricated homes to France. It will allow comparing the environmental impact of importing Canadian prefabricated homes into France with imports of similar products from other European countries.

CMHC Project Officer : *Terry Robinson* — ***CIDN*** : 37840900
Division : CMHC International — ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

FEASIBILITY STUDY AND BUSINESS PLAN FOR A DISTRIBUTED ENERGY FINANCING REVOLVING FUND

This External Research Program feasibility study explores a financing option to support renewable energy systems and energy efficiency measures for the residential sector. Through the creation of a revolving fund facility that could provide low-cost loans to lending intermediaries (e.g. utilities, private or public programs, developers and manufacturers, etc.), this fund could finance existing or new residential sustainable initiatives.

CMHC Project Officer : *Alejandra Villarroel* ***CIDN*** : 38840215
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

FINANCE MECHANISMS IN SUPPORT OF SUSTAINABLE HOUSING

The project will provide a thorough overview of existing options and innovative sustainable housing financing mechanisms and models in Canada, the U.S., the U.K., Australia and other countries as appropriate. Green mortgage and housing finance ideas currently not available but being developed by policy analysts and/or academics will also be researched and finally, a summary of the acquired knowledge from effective (or not) international green lending practices will be presented.

CMHC Project Officer : *Alejandra Villarroel* ***CIDN*** : 38000200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

MORTGAGE MARKET INFORMATION FOR CONSUMERS

This project investigates what is being done domestically and internationally in order to help consumers obtain mortgage market information. Access to mortgage market information can help consumers obtain low-cost housing finance and promote efficiency in the primary mortgage market.

CMHC Project Officer : *Bruno Lamy* ***CIDN*** : 38010200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available ***NEW***

RESEARCH ON INTERNATIONAL HOUSING POLICIES

The purpose of this research is to collect and summarize information on housing policies and strategies in selected OECD/G8 countries, with particular emphasis on the documentation of any formal "national housing strategies".

CMHC Project Officer : *Brian Davidson* ***CIDN*** : 37640200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

CANADIAN HOUSING OBSERVATORY 2009

The Canadian Housing Observer is a flagship CMHC publication which provides comprehensive and authoritative reporting on the state of Canada's housing. The Observer is published annually and is available in print and electronic formats. The analysis presented in the Observer, coupled with the extensive on-line data resources, provides Canada's housing sector with an indispensable tool for identifying, monitoring and addressing housing trends and issues. It is an ideal resource for housing planners and policy makers; housing researchers, educators and students; home builders; housing finance and real estate professionals; and municipal, provincial, and federal housing specialists.

CMHC Project Officer : *Sandra Baynes* ***CIDN*** : 38800200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

IMPACT OF BUSINESS CYCLES ON CORE HOUSING NEED

This project will provide policy makers and researchers with an understanding of the impact of various changes in economic conditions on housing need. The research disaggregates changes in housing need into that part attributable to cyclical factors and that part attributable to structural considerations. This project will also help policy makers understand the potential cyclical aspects of housing need, including, for example, how policy responses to an increase in housing need caused by a temporary surge in unemployment are different from policy responses to an increase in housing need caused by persistent increases in housing and related costs, such as interest rates, utility rates and property taxes.

CMHC Project Officer : *Hoda Shawki* ***CIDN*** : 35010200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SEPARATE LAND AND BUILDING PRICE ESTIMATION MODEL

Most property prices observed on the market include both the price of the land and the price of the building. This External Research Program project explores the question of how to determine the contribution of each of these two components to the total transaction price. The research aims to develop a model for the disaggregation of the total price of a property between its land and building components.

CMHC Project Officer : *Hoda Shawki* ***CIDN*** : 38840213
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SPATIALITY OF HOUSING PRICE RISKS

This External Research Program study is intended to examine the spatiality of housing price risks, price risks being defined as price fluctuations over time. Its objectives are to describe the spatial pattern of price risks and test the main hypothesis that price risks are correlated with the residential built environment. The study will also identify the socioeconomic characteristics of those living in high-risk areas.

CMHC Project Officer : *Roberto Figueroa* ***CIDN*** : 36260214
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

MEASURING THE SOCIAL, ECONOMIC AND ENVIRONMENTAL OUTCOMES OF GOOD HOUSING

This research will provide CMHC with a better conceptual and empirical understanding of the relationship between providing good housing and non-shelter outcomes through a literature review which will document developments across the research landscape, summarize key research findings and results, outline the range of methodologies and indicators used to measure the non-shelter outcomes, and discuss the methodological issues faced by researchers. This project will lay out a methodology framework that will be used to guide future research measuring the non-shelter outcomes of good housing.

CMHC Project Officer : *Nathalie Roy-Patenaude* ***CIDN*** : 37820200
Division : Strategic Planning ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

OVERVIEW OF THE CURRENT STATE OF KNOWLEDGE ON THE NATURE AND EXTENT OF BROADER (NON-HOUSING) SOCIETAL OUTCOMES OF HOUSING

This research will provide an overview of the current state of knowledge on the nature and extent of broader (non-housing) societal outcomes of housing related to education, skills development and employment. It will review existing empirical evidence of the role of housing in contributing to broader societal outcomes, assess the current state of knowledge regarding linkages between housing and broader societal outcomes, identify data gaps, examine related methodological challenges and identify future research challenges and opportunities.

CMHC Project Officer : *Ed Nera* ***CIDN*** : 34430200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

UNDERSTANDING THE STATUS OF VISITABILITY

The goal of this External Research Program study is to analyze the situation regarding Visitable housing in Canada and to determine related barriers, facilitators, best practices, gaps, trends and issues.

Note: No. 08-011 in the Research Highlights Socio-economic Series summarizes the results of this research and is available on the CMHC web site (Order number 65959)

CMHC Project Officer : *Jim Zamprelli* ***CIDN*** : 34380215
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Research highlight is available

INFRASTRUCTURE

ECONOMIC QUANTIFICATION OF THE "SOFT" BENEFITS OF GREEN INFRASTRUCTURE

This External Research Program project is focused on the following question: How can we value the "soft" (difficult to quantify) benefits associated with various types of green infrastructure? The objectives of the study are as follows:-- determine the full range of soft benefits associated with green infrastructure;-- identify the key benefits that are the most feasible to quantify;-- explore evaluation methodologies for each of the key benefits; and -- provide tangible development scenarios showing how the evaluation methodologies could be applied "on the ground".

CMHC Project Officer : *Douglas Pollard* ***CIDN*** : 38840216
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

LAND DEVELOPMENT

PROFILE OF THE LAND DEVELOPMENT INDUSTRY IN CANADA

The key objective of this study is to develop a profile of the land development industry in Canada. Critical to achieving this objective is gaining a clear understanding of what the land development industry is. To accomplish this, the research will be based on an examination of data from Statistics Canada and a review of existing literature. The literature review will serve to define land development, including its role in the national economy generally, and the residential construction industry in particular.

A nationwide industry survey will be a central element of the research. Interviews will be conducted in 16 major urban centres. Survey results will be used to identify drivers of change in the land development industry, such as environmental and public policy initiatives, and will also allow the analysis of how the industry has adapted and developed in response to these drivers. The results of the survey will also be used to identify challenges facing the land development industry over the next 10 years.

CMHC Project Officer : *Mark Holzman* ***CIDN*** : 32540200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

PERSONS WITH DISABILITIES

COMPENDIUM OF CANADIAN ACCESSIBLE HOUSING CODES AND STANDARDS

The goal of this External Research Program project is to research technical accessibility requirements for single family homes and multi-family dwellings and to document best practices and innovative design solutions related to accessible housing. The project will develop a database of technical accessibility requirements in each of the Canadian provinces and territories and in select international jurisdictions, as well as a report comparing the accessibility requirements in different jurisdictions and documenting best practices and innovative design requirements.

CMHC Project Officer : *Hoda Shawki* ***CIDN*** : 38840205
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

EFFECT OF SNOW AND ICE ON EXTERIOR RAMP NAVIGATION BY WHEELCHAIR USERS

Winter represents the most difficult season for people with mobility deficits. These difficulties include slips, falls, increased walking effort, and snow-ice wheelchair obstructions. Considering the amount of time Canadians spend in winter, a remarkably small amount of literature exists on non-sporting winter activities. As a result, guidelines and standards for buildings are predominately based on "dry-land" studies. In the case of residential access ramps, anecdotal feedback from wheelchair users identifies problems with winter accessibility due to the snow-ice surface properties.

CMHC Project Officer : *Ian Melzer*
CIDN : 36260211
Division : External Research Program
STATUS : Ongoing
AVAILABILITY : Product is not yet available

HOUSING PERSONS WITH AN INTELLECTUAL DISABILITY IN INTENTIONAL COMMUNITIES: IDENTIFYING RELEVANT PHYSICAL AND GOVERNANCE STRUCTURES

Although there is a large body of research on the housing needs of individuals with physical disabilities, there is very little on the housing needs of people with intellectual disabilities. This project, undertaken by the Saskatoon Housing Initiatives Partnership (SHIP) and the Saskatchewan Association for Community Living (SACL), was designed to help address this gap.

Researchers at SHIP and SACL wanted to identify the housing needs of individuals with intellectual disabilities and explore the possibility of meeting those needs in an "intentional community"setting. "Intentional community" is a general term covering many housing types, including ecovillages, co-housing, residential land trusts, communes, co-ops and other housing projects in which people "strive together with a common vision." As intentional communities are typically committed to social inclusion, the researchers were curious to see if intentional communities could offer a suitable environment for people with disabilities.

The research had three objectives:
1. To understand how people with an intellectual disability use living spaces in the home and to identify appropriate design features.
2. To identify the features needed in the surrounding community or neighbourhood setting to ensure accessibility.
3. To identify the supports needed so that individuals with an intellectual disability could be meaningfully engaged in the decision-making process of an intentional community.

A joint project of Saskatoon Housing Initiatives Partnership (SHIP) and Saskatchewan Association for Community Living (SACL). Researchers: Jill G. Grant and Anne Westhues. CMHC Project Officer: Jim Zamprelli. Ottawa: Canada Mortgage and Housing Corporation, 2008. (External Research Program Report) 127 pages (2.77 MB)

Note: No. 09-012 in the Research Highlights Socio-economic Series summarizes the results of this research and is available on the CMHC web site (Order number 66464)

STATUS : New Completed Report and Research Highlight
AVAILABILITY : Canadian Housing Information Centre and
ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Ca1%20MH%2008H56%20(w).pdf

LONGITUDINAL STUDY OF HOUSING FOR MENTAL HEALTH CONSUMER-SURVIVORS: FINAL REPORT

This report describes a longitudinal study of the outcomes of two models of supported housing for individuals with serious mental illnesses: a high support model and a lower support model. The progress of 27 tenants at the two sites was tracked on measures of program satisfaction, social support satisfaction, mental health, physical health, and mastery over the course of one year. Measurements were taken at baseline, six months, and 12 months. In addition, interviews were conducted with tenants at baseline and twelve months to understand their goals and the reasons for their decision to move to the particular site they occupied. Significant improvements were found among tenants at the high support model of housing in the following areas: satisfaction with social support, perceptions of mental health, perceptions of physical health, and mastery. At the low support site, there were no statistically significant improvements. Interview data suggest that tenants in both high and low support models are mostly satisfied with their housing, which they consider to be of higher quality than other supported housing they have experienced. Data also suggest that participants are mostly concerned with safety and social interaction, rather than supports, at their supported housing site.

Prepared by Jill Grant and Anne Westhues. CMHC Project Officer: Jim Zamprelli. Ottawa: Canada Mortgage and Housing Corporation, 2008. 42 pages (886.64 KB) (External Research Program Report)

STATUS : New Completed Report

AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/CHIC_Mental_Health(w)_may11.pdf

PATTERNS OF USE OF DIFFERENT TOILET GRAB BAR CONFIGURATIONS

A previous study looking at different toilet grab bar configurations showed that ambulatory and non-ambulatory seniors highly prefer the presence of a grab bar on both sides of the toilet seat contrary to American and Canadian recommended guidelines. This External Research Program study will focus on the "patterns of use" of six (6) different toilet grab bar configurations having grab bars on both side of the toilet seat.

CMHC Project Officer : *Ian Melzer* ***CIDN*** : 34380216

Division : External Research Program ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

PROFILE HOUSING CONDITIONS OF PERSONS WITH DISABILITIES

The project will analyze data from Statistics Canada's 2001 post censal Participation Activity Limitation Survey (PALS) for the production of a series of research highlights profiling the housing conditions of persons with disabilities - the first based on the 2001 Census data, and subsequent highlights focussing on specific disability areas such as agility and mobility, hearing, seeing, speaking/communication, psychiatric or mental health issues, developmental/intellectual, learning disabilities, as well as the specific needs of children and seniors. These will be based on the 2001 PALS data with links to CMHC's custom core housing need data and a range of socio- economic and demographic characteristics from the Census.

CMHC Project Officer : *Janet Kreda* ***CIDN*** : 35780200

Division : Policy and Research Division ***STATUS*** : Ongoing

AVAILABILITY : Product is available on the web

PERSONS WITH DISABILITIES

UPDATING AND ENHANCING CMHC PUBLICATIONS REGARDING CONSTRUCTION AND RENOVATION OF HOMES FOR PEOPLE WITH DISABILITIES

The objective of this project is to produce a number of publications in the CMHC About Your House (AYH) series for use by persons with disabilities, architects, occupational therapists, renovators, builders and the general public. Each will be based on information, to be updated, in the publication "Housing for Persons with Disabilities" and will take into account information contained in other FlexHousingTM and Healthy HousingTM publications. The titles for the AYH series include House Plans and Design, Fire Safety, Interior and Exterior Ramps, Kitchens, Bathrooms and Living Spaces, among others.

CMHC Project Officer : *Jim Zamprelli* ***CIDN*** : 31960200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is available on the web

WELCOMING HOME: SOCIAL SUPPORT AS A BENEFIT OF CONGREGATE LIVING FOR PERSONS WITH MENTAL ILLNESS

This External Research Program qualitative study will examine the benefits of congregate living for individuals who have a mental illness or a concurrent disorder. Research and direct service experience suggests that residing in a self-contained unit is desirable and there is high demand for this type of housing. The objectives of this study are:-- to identify the perceived benefits of residing in self-contained units;-- to determine whether perceived benefits of residing in self-contained units can be achieved by residing in congregate settings; and-- to determine whether additional gains are provided through congregate living (e.g., greater social support) in addition to the perceived benefits of residing in self-contained units.

CMHC Project Officer : *Derek McCall* ***CIDN*** : 38840218
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

RENOVATION AND INSPECTION

ESTIMATING THE COSTS AND BENEFITS OF HOME RENOVATIONS TO ACCOMMODATE AGING AND DISABILITY

This project will apply the new CMHC cost-benefit framework, or model, to estimate the costs and benefits of home renovations to accommodate aging and disability relative to long-term care institutionalization. The project will include a national survey, involving personal interviews with at least 250 RRAP-D and HASI program beneficiaries and 200 telephone surveys to generate statistically reliable estimates of the costs and benefits. At least 50 caregivers of program beneficiaries will also participate. Following the conduct of the surveys, the resulting cost and benefits of the renovations will be compared with available data on the cost and benefits of long-term care institutionalization. This project will produce estimates of the costs and benefits, and cost-benefit ratios, of home renovations to accommodate aging and disability. Such estimates would be useful to policy at the Federal/Provincial/Territorial/Municipal levels related to funding such housing renovations and to the health services sector, regarding related support services programs for seniors and persons with disabilities. The societal impact on care giving and the health care sector will be examined.

CMHC Project Officer : *Derek McCall* ***CIDN*** : 35440200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

See also: Technical Research on Renovation and Inspection, p. 37.

AFFORDABILITY CHALLENGES AND RENTAL MARKET DYNAMICS IN SMALL NOVA SCOTIA COMMUNITIES WITH COMMUNITY COLLEGE CAMPUSES

This report focused on the rental market situation in Nova Scotia small towns where there are campuses of the Nova Scotia Community College (NSCC) system. The primary subject of this report was the housing situation of students within the context of three local markets of various sizes (Truro, Stellarton and Port Hawkesbury). In particular, this report examined various aspects of the local rental markets—supply and demand issues and factors—and assessed the situation of student renters within the local market. The report developed an understanding of the rental market capacity of small communities to provide a range of affordable housing options for residents and for students attending community college campuses located in small towns in Nova Scotia. The major question addressed by this report was: What are the barriers to and opportunities for the provision of affordable housing options in small towns with college campuses?

Prepared by David Bruce, Director, Rural Small Town Programme, Mount Allison University. CMHC Project Officer: Roger D. Lewis. Ottawa: Canada Mortgage and Housing Corporation, 2008. 101 pages (1.02 MB) (External Research Program Report)

Note: No. 09-008 in the Research Highlights Socio-economic Series summarizes the results of this research and is available on the CMHC web site (Order number 66389)

STATUS : New Completed Report and Research Highlight

AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/CHIC_Affordability(w).pdf

EXAMINE THE FEASIBILITY FOR BROADER APPLICATION OF HARM REDUCTION STRATEGIES TO PROVIDE STABLE HOUSING FOR SUBSTANCE USERS

The CMHC Teleforum focused on strategies for implementing Housing First, an approach which involves integrating Housing First clients in non-profit or private rental buildings that serve a mix of tenants, rather than in buildings dedicated to the target population. Participants heard from experts who have used this Housing First approach for several years. These experts work with homeless people living with significant challenges - including substance use and/or mental health issues. This Teleforum appealed to policy makers at all levels of government and in a variety of organizations, agencies that work with homeless people, health care professionals, and housing providers considering dedicating a portion of units to homeless people. There were over 200 participants from across Canada.

CMHC Project Officer : *Jim Zamprelli* ***CIDN*** : 35380200

Division : Policy and Research Division ***STATUS*** : Ongoing

AVAILABILITY : There will be no product for this project

REGULATIONS IN THE RESIDENTIAL CONSTRUCTION INDUSTRY IN QUEBEC AND THEIR EFFECTS ON THE COST OF RENTAL HOUSING

This research will assess the impact of the variety of regulations affecting residential construction in Quebec on the cost of rental housing. The author will conduct a literature search of residential building regulations and interview experts in the housing industry, including building officials in the Ville de Québec, representatives of the Commission de la construction du Québec (CCQ), l'Association de la construction du Québec (ACQ), the Corporation des entrepreneurs généraux du Québec (CEGQ), and several residential builders. The researcher will estimate the costs of residential construction attributed to these regulations, and their effects on housing rents. The project should be complete in 2009.

CMHC Project Officer : *Barry Craig* ***CIDN*** : 28920202

Division : External Research Program ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

CASE STUDIES OF SUSTAINABLE GREENFIELD RESIDENTIAL DEVELOPMENTS

The current approach to residential development that consumes open space on the urban fringe for single-detached dwellings on large lots is recognized as neither economically nor environmentally sustainable. This project is to document sustainable ("green") residential development case studies from across Canada so that developers, municipalities, housing professionals, and community groups can learn about success stories and replicate these "green" solutions, where applicable.

CMHC Project Officer : *Mark Holzman* ***CIDN*** : 29490200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

EDGE EFFECTS WITHIN MUNICIPAL FORESTS: ARE MUNICIPAL POLICIES EFFECTIVE IN LIMITING RESIDENTIAL ENCROACHMENT INTO THE EDGES OF SUBURBAN WOODED PARKLANDS?

This research evaluated the extent of encroachment by neighbouring residential landowners into wooded parklands adjacent to their backyards. Field studies were conducted within the edges of 40 selected forests within six municipalities in southern Ontario: Cambridge, Guelph, Kitchener, Mississauga, Oakville and Waterloo. These studies determined the effectiveness of several different types of edge treatment, such as fencing, municipal boundary marker, and no municipal boundary policies for limiting encroachment activities. In addition a content analysis review of official and secondary plans, and personal interviews with key municipal informants investigated municipal policies on encroachment.

The research found high levels of visible encroachment. The unobtrusive measurement of encroachment activities within municipal forest edges indicated that when no boundary demarcation policy was implemented, high mean frequencies and intensities of all types of encroachment occurred, in addition to high mean maximum extents of encroachment. While both municipal fencing and boundary demarcation policies led to lower mean intensities, and in the case of fencing, lower mean maximum extents of encroachment, than sites with no boundary demarcation policy, encroachment intensities and extents were still significant.

In general, municipal policies were found to be insufficient to address the edge-resident encroachment issue and the report identifies the deficiencies in both the policies and their implementation. The research concludes with recommendations that address the need for more complex boundary policies, enforcement and monitoring to meet the complexity and scope of the encroachment problem.

Prepared by W.J. McWilliam, P.F.J. Eagles, and M.L. Seasons, School of Planning, University of Waterloo, Ontario, Canada. CMHC Project Officer: Susan Fisher. Ottawa: Canada Mortgage and Housing Corporation, 2008. 44 pages (354.11 KB) (External Research Program Report)

STATUS : New Completed Report
AVAILABILITY : Canadian Housing Information Centre and
ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Ca1%20MH%2008E22_(w).pdf

GOVERNMENT-IMPOSED CHARGES ON NEW HOUSING IN CANADA: FINAL REPORT

This study examined government-imposed charges (GICs) on new housing in Canada. Such costs include the full range of levies, fees, charges and taxes that are imposed by all levels of government due to the development, sale, and ownership of housing. GICs may affect the price of housing, the price of land and the returns on capital investments in general in Canada, and are therefore of great

interest to the housing industry and Canadian consumers. Municipal and provincial officials may also wish to use this report to compare their charge levels against other jurisdictions in Canada.

The objectives of this study were to:

- update the estimates of GICs from two previous studies prepared for CMHC; and
- report on trends in GICs since the previous study.

Prepared by Ray Tomalty, Co-operative Research and Policy Services and Andrejs Skaburskis, Queen's University at Kingston, with the assistance of Laura Manville, Federico Cartin-Arteaga and Luba Serge. Ottawa: Canada Mortgage and Housing Corporation, 2009. 166 pages (854 KB)

Note: No. 09-009 in the Research Highlights Socio-economic Series summarizes the results of this research and is available on the CMHC web site (Order number 66401)

STATUS : New Completed Report and Research Highlight

AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Government%20Imposed(w)_may6.pdf

IMPACT OF DEVELOPMENT COST CHARGES ON HOUSING AFFORDABILITY

The objectives of this project are to:
(i) investigate the impact of development cost charges on the price and affordability of housing in Canada;
(ii) identify the costs and benefits of both infill and new subdivision developments in Vancouver, Calgary, Winnipeg, Toronto, Montreal and Halifax; and
(iii) quantify the up-front and ongoing costs or benefits of infill and new subdivision development on the residents of the new development, residents of existing developments, the local government and the community at large.

CMHC Project Officer : *Mark Holzman* ***CIDN*** : 34060200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

IN PURSUIT OF SUSTAINABLE NEIGHBOURHOOD DEVELOPMENT PATTERNS: THE NEXT STEP - A ROAD SAFETY EVALUATION OF ROAD NETWORK PATTERNS, INCLUDING CMHC'S FUSED GRID ROAD NETWORK PATTERN

The objectives of this External Research Program project are to:
1) develop models for use by Ottawa planners and engineers to do empirical road safety planning;
2) apply these models in a case study using actual data, to evaluate the level of safety of CMHC's Fused Grid pattern; and
3) compare the road safety of the Fused Grid road network with four other road network patterns.

CMHC Project Officer : *Mark Holzman* ***CIDN*** : 38840212
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

LIVEABLE LANES: OVERCOMING BARRIERS TO LANE WAY INFILL HOUSING IN B.C.'S GROWING COMMUNITIES

This study aims to identify and shed light on barriers to lane way infill housing in B.C.'s growing communities. It will develop strategies and recommendations for overcoming them and broaden interest in lane way infill housing among residents, builders and other housing sector stakeholders. A final report has been completed and will be published, along with a Research Highlight, in 2009.

CMHC Project Officer : *Susan Fisher* ***CIDN*** : 34380209
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

RESIDENTIAL DEVELOPMENT AROUND TRANSIT NODES

This project will result in 10 case studies of residential development around transit nodes across Canada. This will be done by interviewing the developers and municipal planners involved in the developments and surveying occupants. The aim is to provide developers, municipalities and housing professionals with insights into the successes of the developments and how challenges were or could be overcome, to help them in replicating and building on those solutions. The first five case studies have been published. An additional five case studies and a Research Highlight have been completed and will be published in 2009.

CMHC Project Officer : *Susan Fisher* ***CIDN*** : N/A
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

STORMWATER MANAGEMENT CASE STUDIES

This project will examine 5 built case studies of green stormwater management innovations in residential developments in Canada. The study would examine the successes and lessons learned about those practices including their marketability and profitability, costs (particularly in comparison to standard practices), design and technical barriers and innovations, regulatory issues, occupant satisfaction, municipal involvement, liability issues, etc. The goal is to inform other developers of the successes and lessons learned from these innovative practices so they can replicate and build on those solutions. It will result in the publication of 5 case studies and a research highlight synthesizing the findings of the case studies.

CMHC Project Officer : *Susan Fisher* ***CIDN*** : 35250200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

ASSESSING THE IMPLICATIONS OF POPULATION AGING ON THE EXISTING HOUSING STOCK: IMPLICATIONS OF POPULATION AGING FOR REAL HOUSING PRICES

Population aging is a trend that will accelerate in Canada in the next two decades with the aging of the baby boom generation. The goal of this research is to study the effects of population aging on real housing prices in Canada. The project includes a review of the Canadian and the international literature on the effects of demographic changes on real housing prices and the development of an econometric model of these effects for Canada. The model is used to project real housing price changes in Canada and in each province for the next 20 years under different scenarios.

CMHC Project Officer : *Hoda Shawki* ***CIDN*** : 37680200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

DETERMINING THE IMPLICATIONS OF THE AGING OF THE CANADIAN POPULATION FOR HOUSING AND COMMUNITIES

The objective of this project is to examine the specific implications of the aging of the Canadian population for housing and communities. The research will be based on existing data and literature, new practical information from experts and key informants in communities, and case studies of communities that have already reached the proportions of seniors that Canada is expected to have over the next 30 years. The emphasis will be on identifying the challenges and opportunities for planning, designing and managing communities (i.e. cities, small towns and suburbs) with increasing older populations. While the project will deal with a range of issues, the main focus will be on urban form and housing. Other related issues, such as transportation, will have a secondary focus.

Note: No. 08-003 in the Research Highlights Socio-economic Series summarizes the results of this research and is available on the CMHC web site (Order number 65913)

STATUS : Completed
AVAILABILITY : Research highlight is available

DEVELOPMENT OF TRAINING MODULES AND CURRICULUM ON HOUSING FOR SENIORS AND PEOPLE WITH DISABILITIES FOR THE ARCHITECTURAL PROFESSION AND EDUCATION INSTITUTIONS WITH CONSTRUCTION-RELATED PROGRAMS

The objective of this project was to identify the most effective techniques for the development and delivery of seminars on seniors' housing for architects, architectural technologists, and other building and design professionals. The outputs of the project were learning and training materials, as follows:

1. A Module on Residential Adaptations for Independent Living - a PowerPoint presentation, case study, proficiency exercises, a Facilitator's Guide and a Student Guide;
2. A Module on Designing for Dementia - a PowerPoint presentation, a Facilitator's Guide and a Student Guide; also
3. A case study and proficiency exercises were developed as interactive materials to be used in a web environment.

Material will be available on the CMHC web site, www.cmhc.ca, in due course.

CMHC Project Officer : *Jim Zamprelli* ***CIDN*** : 26780200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Seminar/training is available

GOVERNANCE OF SOCIAL HOUSING FOR SENIORS: A COMPARATIVE ANALYSIS

The primary objective of this research is to compare the governance of housing for seniors in Quebec, Ontario and Denmark and, in particular, the linkage between housing and home support services. The assumption is that certain types of governance promote a better linkage between home support and housing, but that the players are also important in this linkage. The goal is to find out which structures and which initiatives seem better.

CMHC Project Officer : *Ian Melzer* ***CIDN*** : 28920206
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

OPTIONS AND STRATEGIES TO CREATE AFFORDABLE HOUSING FOR LOW-INCOME SENIORS

This project will result in a practical resource document, or manual examining the range of options and strategies that can be considered to create affordable housing and provide access to affordable housing for low-income seniors. The document will increase policy makers' ability to understand the problem and identify issues causing affordability problems faced by low-income seniors; to understand how these can be addressed through policy, programs or other actions; and to advise governments and others on approaches they can take and decisions they can make.

CMHC Project Officer : *Ian Melzer* ***CIDN*** : 38200200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

PROBABLE EFFECTS OF AN AGING POPULATION ON THE HOUSING MARKET: A PROSPECTIVE STUDY

In the coming decades, Quebec will be confronted by an aging population. Though the impacts on employment seem obvious and well documented, the same cannot be said, unfortunately, for the housing field, even though the consequences will be just as important. This research will follow the path baby boomers have been taking since 1965 and will attempt to identify the main upheavals that will affect the housing market from now until 2050.

CMHC Project Officer : *Ian Melzer* ***CIDN*** : 36260206
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

REGULATING SUPPORTIVE HOUSING FOR SENIORS: A MODEL COMPREHENSIVE STATUTE: FINAL RESEARCH REPORT

The objective of this study was to develop a framework for a model comprehensive statute that can be useful to supportive housing providers, consumers, advocates, and policy makers. The framework is designed to promote and facilitate discussion across Canada as provinces and territories consider and develop their own approach to the regulation of supportive housing for seniors. The framework addresses three important questions: What are the key issues that must be addressed? What approaches to these issues are possible? What are the benefits and drawbacks of these approaches in this context?

The framework reflects feedback from a range of experts, policy makers, and housing providers from across Canada. The model statute includes provisions relating to definitions, residents' rights and responsibilities, types of housing tenure, project management and staffing, complaints and dispute resolution, monitoring and assistance, building standards and design features, support services, staffing, and information. The statute also includes a "checklist" of questions for prospective residents of supportive housing.

Prepared by Margaret Hall. CMHC Project Officer: Luis Rodriguez. Ottawa: Canada Mortgage and Housing Corporation, 2008. 90 pages (516 KB) (External Research Program Report)

STATUS : New Completed Report

AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/Ca1%20MH%2008R26%20_(w).pdf

SMART GRAB BARS: A POTENTIAL INITIATIVE TO ENCOURAGE BATH GRAB BAR USE IN COMMUNITY DWELLING OLDER ADULTS

Seniors frequently fall in the bathroom despite the presence of bath grab bars, as they have reported not always using them. This External Research Program project focuses on further developing an unobtrusive device, the smart grab bar, to encourage its use while bathing to decrease the risk of falls, and to evaluate its effectiveness in the target population.

CMHC Project Officer : *Derek McCall* ***CIDN*** : 38840207

Division : External Research Program ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

EVALUATING SOCIAL HOUSING AS A HEALTH INTERVENTION IN THE GTA WEST AREA

This study will provide evidence-based knowledge of the impacts of improved housing conditions on the health status of low-income Canadians in order to support more informed discussion and decisions concerning the contribution that housing programs make to improving the health of vulnerable populations. It will gather data from persons initially on the waiting lists of housing authorities in an area west of Toronto.

CMHC Project Officer : *Derek McCall* ***CIDN*** : 35330200

Division : Policy and Research Division ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

REGENT PARK LONGITUDINAL HEALTH STUDY

This study will investigate the effects of the Regent Park Social Housing Revitalization Project - Phase 1 Redevelopment on the health and well-being of residents, and how interventions in the built environment may reduce health inequalities and improve the lives of low-income, urban populations, using a quasi-experimental research design. The redevelopment plan seeks to: a) create social mix; b) promote positive social interaction (using innovative architectural and urban designs); and c) create affordable home ownership for a subset of residents.

CMHC Project Officer : *Mark Salerno* ***CIDN*** : 34470200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

REGENT PARK REVITALIZATION: YOUNG PEOPLE'S EXPERIENCE OF RELOCATION FROM PUBLIC HOUSING REDEVELOPMENT

This External Research Program project will assess the social impacts of relocation of residents — particularly young people aged 12-17 years — during redevelopment of their public housing community. Toronto Community Housing Corporation (TCHC) recently began phased redevelopment of Regent Park, Canada's oldest and largest public housing project.

CMHC Project Officer : *Cynthia Rattle* ***CIDN*** : 36260209
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SOCIAL HOUSING SURVEYS AND ANALYSIS IN SUPPORT OF THE LONG-TERM MANAGEMENT OF THE STOCK

This project involves the development and implementation of a methodology for data collection and analysis of the current physical condition of social housing, the socio-economic characteristics of residents and financial conditions (including adequacy of replacement reserves) of social housing in the context of planning for the longer-term management of this housing. The second part of this project will involve the actual survey and analysis work. The consultant will use the methodology developed under phase one to collect and assess the data, and prepare a report.

CMHC Project Officer : *Brian Davidson* ***CIDN*** : 37550200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SUPPORTIVE/SUPPORTED HOUSING WITHIN SOCIAL HOUSING

This project will examine the role of social housing in providing the housing component of supported/supportive housing, to include: a description of supported or supportive housing models within social housing and an estimate of its prevalence; an analysis of the experiences with supported/supportive housing within social housing, from the point of view of housing providers, service providers, residents and government agencies; a review of successful partnerships, lessons learned and best practices in the provision of supported/supportive housing.

CMHC Project Officer : *Jim Zamprelli* ***CIDN*** : 38220200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available ***NEW***

COMMUNITY AND DESIGN CHARRETTES PLANNING WITH ENHANCED FOLLOW-UP SUPPORT

This project will enable the development of a community plan that implements sustainable neighbourhood design and housing practices identified in a community planning charrette and includes follow-up support for the refinement and implementation of design alternatives identified in the charrette.

CMHC Project Officer : *Mark Holzman* ***CIDN*** : 36510200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

FAMILIES LIVING DOWNTOWN: CHALLENGES AND BENEFITS

This External Research Program study will examine the housing-related experiences of families who are choosing to live in or near downtown areas. It will examine the reasons for their choice, how they are managing their urban life with their children, and the challenges and benefits they experience once they have lived there for some time. These experiences will be related to key objective measures of their own residence and their downtown neighbourhood. This research will complement previous views on how to plan central areas for families by studying the experiences of downtown family residents, those who actually "live their life" there.

CMHC Project Officer : *Mark Holzman* ***CIDN*** : 34380210
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

INDEX FOR LANDSCAPE GUIDE FOR CANADIAN HOMES

This project will add the following new and updated features in "Landscape Guide for Canadian Homes": an index, photos of each plant in the plant list, updates to "resources and further reading" section.

CMHC Project Officer : *Susan Fisher* ***CIDN*** : 36710200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

REDUCING THE PLANNING APPROVALS PROCESS THROUGH ENHANCED SUSTAINABILITY: DOCKSIDE GREEN CASE STUDY

This project will examine the success of the Dockside Green development in Victoria, BC, in reducing the anticipated planning approvals process from over three years to under one year. By incorporating sustainable development features, the project generated tremendous community support that resulted in no opposition during the planning approvals process, saving significant time and money for both the developer and the municipality. The project will document the process, other future approvals that may be required, and the verification process used by the City to ensure the sustainable features were incorporated as promised. The research will also examine the developers' motives behind incorporating specific features, the lessons from their experience, and any changes in the City's position on sustainable community planning.

CMHC Project Officer : *Lance Jakubec* ***CIDN*** : 35240200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SUSTAINABILITY INDICATORS FOR COMPUTER-BASED TOOLS IN COMMUNITY DESIGN

This External Research Project will evaluate sustainability indicators for potential integration with widely used geographic information system based modelling and visualization tools. It will refine the content and method of the indicators most suitable for such integration, propose new indicators where necessary, test refined and proposed indicators in a case study project and evaluate the results for broad application.

CMHC Project Officer : *Douglas B Pollard* ***CIDN*** : 34380211
Division : External Research Program ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

SUSTAINABLE COMMUNITY PLANNING AND DESIGN CHARRETTE SUPPORT AND PARTICIPATION

This project will continue to contribute to sustainable community design charrettes by providing financial and event planning assistance and/or direct CMHC staff participation and publication of results for certain selected charrettes. A charrette was held in Fort McMurray, Alta. and Perth, Ontario. There will be another in Winnipeg and other potential charrettes have been identified and are being pursued. Further charrettes were held in Saskatoon for their Rivergreen Ecovillage project and in Smithers, BC in regards to their downtown revitalization plan. Reports on both charrettes are in progress and under review. Research highlights on the Dryden and Sandy Hill charrettes are in the final editing phase.

CMHC Project Officer : *Mark Holzman* ***CIDN*** : 34110200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

UNDERSTANDING THE SMART GROWTH GAP

This project will investigate the reasons for the gap between stated municipal policy objectives, which align with the goals of Smart Growth, and the results on the ground. It will aim to answer the following questions:

- What prevents the accomplishment of set goals?
- Are the goals inherently unachievable?
- What are the expected impacts of Smart Growth practices under a normal positive scenario?
- What time lines can be speculated or calculated for prescribed outcomes?
- What strategies are deemed most effective with respect to the level of impact?

The intent of this research is to enable local governments and industry to lay out a strategy that will produce sustained positive outcomes with predictable beneficial effects for the environment and for the well-being of community residents.

CMHC Project Officer : *Mark Holzman* ***CIDN*** : 35230200
Division : Policy and Research Division ***STATUS*** : Ongoing
AVAILABILITY : Product is not yet available

See also: Technical Research on Sustainable Development & Healthy Housing, p. 37
FINANCE MECHANISMS IN SUPPORT OF SUSTAINABLE HOUSING, p. 62

URBAN TRANSPORTATION

FUSED GRID ASSESSMENT: TRAVEL AND ENVIRONMENTAL IMPACTS OF CONTRASTING PEDESTRIAN AND VEHICULAR CONNECTIVITY: FINAL REPORT

This study evaluates the effect of improved directness of neighbourhood pedestrian routes on the decision to walk rather than drive. Results suggest that street designs featuring more direct routes for pedestrians, relative to those enjoyed by drivers in the network, are associated with more walking. This result is consistent with the premise of the Fused Grid street network pattern, which is characterized by more pedestrian pathways than vehicular routes.

Prepared by Lawrence Frank and Chris Hawkins. CMHC Project Officer: Fanis Grammenos. Ottawa: Canada Mortgage and Housing Corporation, 2007. 88 pages (1.47 MB) (External Research Program Report)

Note: No. 08-013 in the Research Highlights Socio-economic Series summarizes the results of this research and is available on the CMHC web site (Order number 66086)

STATUS : New Completed Report and Research Highlight

AVAILABILITY : Canadian Housing Information Centre and ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/eng_unilingual/CHIC_Fused_Grid(w).pdf

See also: ACTION RESEARCH ON TRANSPORTATION AND HOUSING AFFORDABILITY, p. 55

WOMEN AND HOUSING

BUILDING COMMUNITY: THE STORY OF SUPPORTIVE HOUSING FOR YOUNG MOTHERS (SHYM)

This External Research Program research project employs a case study methodology to study supportive housing arrangements and their impacts on tenants. The project is focused on Supportive Housing for Young Mothers (SHYM), a supportive housing program in Halifax, Nova Scotia, and its effectiveness in providing housing and support services to its tenants. Using in-depth interviews with SHYM tenants as well as the Camberwell Assessment of Need, the study aims to shed light on the tenants' experience at SHYM, the short-term and long-term needs that SHYM is addressing, and the sustainability of the programmatic components of SHYM.

CMHC Project Officer : *Hoda Shawki* ***CIDN*** : 38840208

Division : Policy and Research Division ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

HOUSING DIFFICULTIES AND HOUSING PROGRAMS IN THE LIVES OF ABUSED WOMEN

This External Research Program project intends to learn more about the housing difficulties and experiences of women who have experienced different kinds of interpersonal violence (i.e. spousal, family, and landlord), including the role of discrimination, and to explore how their experiences vary as a function of the kind of violence.

CMHC Project Officer : *Sandra Baynes* ***CIDN*** : 38840203

Division : External Research Program ***STATUS*** : Ongoing

AVAILABILITY : Product is not yet available

CMHC RESEARCH REPORT LISTINGS

To provide quick and comprehensive access to CMHC research published on a given topic, the Canadian Housing Information Centre compiles comprehensive listings of housing research produced over a number of years on certain topics. Topics chosen are those for which there is ongoing client interest and/or for which CMHC has published considerable research. To obtain an electronic, faxed or mailed copy of any of the lists below, contact the Canadian Housing Information Centre at: 1-800-668-2642 or e-mail us at: chic@cmhc.gc.ca

Listings available at this time include:

♦ Aboriginal Housing	♦ Acoustics
♦ Affordable Housing	♦ Airtightness
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♦ Environmental Site Assement and Contaminated Lands	♦ Healthy Housing
♦ Heating and Ventilation	♦ Homelessness
♦ Housing and Women	♦ Housing Export Opportunities
♦ Housing for Older Canadians	♦ Housing for Persons with Disabilities
♦ Indoor Air Pollution	♦ Infrastructure
♦ Lead	♦ Log Home Construction
♦ Manufactured Housing	♦ Moisture Problems
♦ Mortgages and Housing Finance	♦ Newcomers, Immigration & Settlement
♦ Northern Housing	♦ Rental Housing
♦ Residential Construction Waste	♦ Residential Renovation
♦ Self Help Housing	♦ Social Housing
♦ Straw Bale Housing	♦ Sustainable Development
♦ Water Conservation, Reuse and Management	

ABOUT YOUR HOUSE SERIES

Fact sheets on common housing questions, issues and problems.

These documents are available in HTML and Adobe Acrobat format (pdf) on the CMHC web site at:
http://www.cmhc.ca/en/co/co_001.cfm

Print copies can be obained by calling 1-800-668-2642

Order no.	Series no.	Title
62027	CE 1	**Measuring Humidity in Your Home** Is there condensation on the windows? Are there wet stains on the walls or ceilings? Is there static or sparks whenever you touch something? Diagnose humidity problems in your home. Aussi disponible en français sous le titre : Mesurer l'humidité dans votre maison
62028	CE 2	**Combustion Gases in Your Home** Do you have a gas or oil fired furnace, boiler or water heater? What about a woodstove or fireplace? Take the necessary steps to keep combustion gases out of your home. Aussi disponible en français sous le titre : Les gaz de combustion dans votre maison
62029	CE 3	**Asbestos** What is asbestos? Why is it so useful? What problems can asbestos cause and what options does the homeowner have in dealing with them? Aussi disponible en français sous le titre : Amiante
62030	CE 4	**Hydronic Radiant Floor Heating** Heating option for homes. Tubes are placed in concrete floor with water running through. Popular in bathrooms and kitchen, and can be done for entire house - new or existing. Aussi disponible en français sous le titre : Système de chauffage à eau chaude par rayonnement à partir du sol
62031	CE 5A	**Understanding Window Terminology** This factsheet offers helpful guidance on buying the right type of window for your home. Terminology commonly used in the window industry is also presented. Aussi disponible en français sous le titre : Comprendre la terminologie des fenêtres
62032	CE 6	**Urea-Formaldehyde Foam Insulation (UFFI)** What is UFFI? Why was it banned? Should you be concerned about UFFI? How do you know if your home has UFFI? Aussi disponible en français sous le titre : Mousse isolante d'urée-formaldéhyde (MIUF)

Order no.	Series no.	Title
60515	CE 7	**After the Flood** Protect your health and prevent further damage to your home by following this step-by-step guide to restoring your home after a flood. Aussi disponible en français sous le titre : Après une inondation
60516	CE 8	**Fighting Mold: The Homeowner's Guide** Mold can cause allergies or respiratory disease. Learn how to identify and eliminate mold from your home. Aussi disponible en français sous le titre : Combattre la moisissure -- Guide pour les propriétaires-occupants
62043	CE 9	**Maintaining Your HRV** For a clean and healthy living environment, review the seven steps to maintaining the Heat Recovery Ventilator (HRV). Aussi disponible en français sous le titre : L'entretien du VRC
60339	CE 10	**Wood Heat Safety in an Emergency** Whether you often use a wood stove or a fireplace, or are coping with an emergency loss of electricity, learn how to safely use wood to heat your home. Aussi disponible en français sous le titre : Le chauffage au bois en toute sécurité lors d'une situation d'urgence
60356	CE 11	**When You Must Leave Your House Due to Prolonged Winter Power Outage** A series of practical tips to protect your home in case you are required to evacuate for more than 24 hours because of power failure. Aussi disponible en français sous le titre : Si vous devez quitter votre maison à cause d'une longue interruption de courant en hiver
60360	CE 12	**Helping Your Trees Survive Storm Damage** Practical pruning advice to restore the health and shape of trees damaged by ice or wind storms. Aussi disponible en français sous le titre : Soins à donner aux arbres endommagés par une tempête
62034	CE 13	**Attic Venting, Attic Moisture, and Ice Dams** How do you deal with a leak in the ceiling? How should an attic be properly vented? How do you eliminate ice dams? This fact sheet will answer these and other attic related questions. Aussi disponible en français sous le titre : Ventilation du vide sous toit, humidité dans le vide sous toit et formation de barrières de glace

Order no.	Series no.	Title
62035	CE 14	**Soot Staining on Carpets** Does your carpet have permanent dark stains near baseboards, air registers or under doorways? Find out what causes carpet streaking and what you can do about it. Aussi disponible en français sous le titre : Taches en traînée sur les moquettes
62036	CE 15	**Removing Ice on Roofs** Whether you have a sloped or flat roof, learn techniques that will help you deal with extensive roof icing or ice dam problems. Aussi disponible en français sous le titre : L'enlèvement de la glace sur les toitures
62037	CE 17	**The Importance of Bathroom and Kitchen Fans** Choosing the proper kitchen and bathroom fans is important for improving indoor air quality and maintaining ideal humidity levels. Aussi disponible en français sous le titre : Importance des ventilateurs de cuisine et de salle de bains
62038	CE 18	**How to Read a Material Safety Data Sheet (MSDS)** Reading and understanding the Material Safety Data Sheet (MSDS) provides product information about product hazards and the necessary safety precautions to follow when using it. Aussi disponible en français sous le titre : Comment déchiffrer une fiche technique sur la sécurité des substances (FTSS)
62039	CE 19	**Insulating Your House** Choose the right insulation to reduce the amount of energy you use and to make your home more comfortable. Aussi disponible en français sous le titre : L'isolation de votre maison
62040	CE 21	**Log Homes: Frequently Asked Questions** A list of questions and answers concerning the unique design and building considerations for log homes. Aussi disponible en français sous le titre : Foire aux questions - maisons en rondins
62041	CE 22	**Your Furnace Filter** To reduce exposure to airborne particles, choose the furnace filter that best suits your needs. Aussi disponible en français sous le titre : Le filtre de votre générateur d'air chaud

Order no.	Series no.	Title
62042	CE 23	**Water-Saving Tips for Your Lawn and Garden** Often water is applied inefficiently, resulting in significant waste due to over watering, evaporation or run-off. Here are some general watering tips to avoid such waste. Aussi disponible en français sous le titre : Comment entretenir vos pelouses et jardins en économisant l'eau
60417	CE 24	**Backup Power for Your Home** The top ten tips in choosing the appropriate backup system to provide electricity to your home in the event of a prolonged power failure. Aussi disponible en français sous le titre : Alimentation de secours pour votre maison
62046	CE 25	**Carbon Monoxyde** A list of questions and answers dealing with keeping Carbon Monoxide out of your home and to help you choose the right CO detector. Aussi disponible en français sous le titre : Le monoxyde de carbone
62277	CE 26a	**Hiring a Contractor** How do you find the "right" contractor for you? What should go in a contract? What are liens, holdbacks and completion certificates? Make sure you get what you want and pay for when hiring a contractor. Aussi disponible en français sous le titre : Le Choix d'un entrepreneur
62351	CE 26b	**Sample Renovation Contract** A detailed written contract between you and the contractor you hire is essential to any renovation or home repair project, no matter its size. Aussi disponible en français sous le titre : Modèle de contrat de rénovation
62045	CE 27	**Choosing a Dehumidifier** Air that is too damp can cause condensation on windows, water damage to materials, mold and even wood rot. Choose the right dehumidifier to regulate the humidity in your home. Aussi disponible en français sous le titre : Le Choix d'un déshumidificateur
	CE 28	**The Renovation Project (12 parts)**
		This series will assist you in making informed decisions before you renovate. Each easy-to-read fact sheet helps you ask the key questions, reviews the available options and discusses the consequences if certain aspects of the renovation are overlooked. Advance planning is the key to successful renovations. These fact sheets help you plan, assess, and avoid surprises. Achieve the results you want by doing your renovation right the first time.

Order no.	Series no.	Title
62246	CE 28a	**Assessing the Renovation Project** Before renovating, it's important to assess your home's current condition to determine if there are significant problems that you must deal with before or during the renovation project. Aussi disponible en français sous le titre : Évaluation des travaux de rénovation
62248	CE 28b	**Renovating your Basement - Structural Issues and Soil Conditions** Renovating a basement can add value and extra living space to a home. Fixing foundation problems before renovating is essential to preserve the durability and structure of the house. Aussi disponible en français sous le titre : Rénovation du sous-sol - Aspects structuraux et conditions du sol
62250	CE 28c	**Renovating Your Basement - Moisture Problems** Is there condensation on the basement windows? Are there white chalky stains on the foundation? Do the carpets smell musty? Creating a clean, dry and healthy living space is a critical first step. Aussi disponible en français sous le titre : Avant de rénover votre sous-sol - Problèmes d'humidité
62252	CE 28d	**Renovating Your Kitchen** The kitchen is often the most used room in the house and kitchen renovations typically have the highest financial payback. Conduct a pre-renovation inspection and prioritize the most desirable features for your new kitchen. Aussi disponible en français sous le titre : Avant de rénover votre cuisine
62254	CE 28e	**Renovating Your Bathroom** Bathroom renovations offer the second highest financial payback rate and are one of the most common home improvement projects. Use this fact sheet to check for problems before you renovate. Aussi disponible en français sous le titre : Rénovation de la salle de bains
62256	CE 28f	**Window and Door Renovations** Do you want more natural light in your living area? Are you concerned about security? Before repairing or replacing windows and doors, consider all of the factors outlined in this fact sheet. Aussi disponible en français sous le titre : Nouvelles portes et fenêtres

Order no.	Series no.	Title
62258	CE 28g	**Repairing or Replacing Roof Finishes** Regular maintenance and periodic roof inspections will identify problems before they cause costly damage to your home. Learn about the key factors that will determine whether you should repair or replace your roof. Aussi disponible en français sous le titre : Avant de réparer ou remplacer le revêtement du toit
62260	CE 28h	**Repairing and Replacing Materials - Exterior Walls** Exterior finish materials must prevent rain and snow from penetrating the building and causing moisture damage. Repairing or replacing exterior wall finishes will protect and preserve the durability and structure of the home. Aussi disponible en français sous le titre : Avant de réparer ou remplacer des matériaux - les murs extérieurs
62262	CE 28i	**Energy Efficient Retrofit - Mechanical Systems** Upgrading the heating, cooling and ventilation (HVAC) equipment is the best way to create a healthy, comfortable and less expensive home to operate. Before altering these, it is important to understand how the overall performance of the house will be affected. Aussi disponible en français sous le titre : Avant d'améliorer l'efficacité énergétique de votre maison - installations mécaniques
62264	CE 28j	**Energy Efficient Retrofit - The Building Envelope** The envelope, or outer layer, of your house separates living space from the outdoor elements. Improving it can result in a better insulated, more airtight home that is easier to heat. Aussi disponible en français sous le titre : Améliorer l'efficacité énergétique - L'enveloppe du bâtiment
62266	CE 28k	**Assessing the Comfort and Safety of Mechanical Systems** The heating, ventilating and air conditioning (HVAC) systems are a vital part of your home. Ensure that your mechanical systems are operating safely and efficiently. Aussi disponible en français sous le titre : Évaluation de vos installations mécaniques - confort et sécurité
62268	CE 28L	**A New Addition** Before building an addition, clearly identify the features you need and inspect the current structure and mechanical systems to be sure they can support the new addition. Aussi disponible en français sous le titre : Avant de construire une annexe

Order no.	Series no.	Title
62044	CE 29	**Should you get your Heating Ducts Cleaned?** Should you get your heating ducts cleaned? Will clean ducts result in improved air quality? When is duct cleaning most appropriate? This fact sheet separates fact from fiction. Aussi disponible en français sous le titre : Doit-on faire nettoyer les conduits de chauffage?
63322	CE 30	**Water Damage, Mold and House Insurance** You've had water damage in your house due to a burst pipe, a roof leak, or a heavy summer storm. You hope that your insurance will cover the damage. What to do? Aussi disponible en français sous le titre : Moisissure, dommages causés par l'eau et assurance habitation
62226	CE 31	**Understanding and Dealing with Interactions Between Trees, Sensitive Clay Soils and Foundations** Is the size, type or siting of a tree affecting your foundation? Understanding the interactions between trees, soils and the foundation can help you avoid foundation shifting, cracks and other damage. Aussi disponible en français sous le titre : Comprendre l'interaction des arbres, du sol d'argile sensible et des fondations et agir en conséquence
65329	CE 32	**Setback Thermostats** There are many claims about the energy savings due to setback thermostats. This document quantifies the savings but also describes houses or conditions where setback thermostats are not recommended. Aussi disponible en français sous le titre : Les thermostats programmables
62288	CE 33	**CMHC Garbage Bag Airflow Test** This simple test uses an ordinary garbage bag to help you estimate airflow from your furnace registers, bathroom exhaust fan or clothes dryer exhaust. Aussi disponible en français sous le titre : Essai de mesure du débit d'air à l'aide d'un sac à ordures
62795	CE 34	**Your Septic System** A primer on the components, operation and proper maintenance of an in-ground septic tank and system. Aussi disponible en français sous le titre : Votre installation d'assainissement
62839	CE 35	**Hiring a Home Inspector** One of the best ways to understand about a home's condition, habitability and safety is to hire a professional home inspector. Aussi disponible en français sous le titre : Le Choix d'un inspecteur en bâtiment

Order no.	Series no.	Title
62341	CE 36	**The Condominium Owners' Guide to Mold** Special advice for identifying and removing mold in a condo, and solving the problems that cause it. Aussi disponible en français sous le titre : Guide sur la moisissure à l'intention des copropriétaires
63902	CE 37	**The Tenant's Guide to Mold** This guide provides tenants of apartment buildings or rental houses with information to understand why mold grows and what they can do if they find mold growing in their unit. Aussi disponible en français sous le titre : Guide sur la moisissure à l'intention des locataires
64066	CE 38	**How to Reduce Chemical Contaminants in Your Home** This guide focuses on reducing exposure to chemical contaminants in the home, and will help you identify and avoid household products and materials which are sources of chemical contaminants. Aussi disponible en français sous le titre : Réduire les contaminants chimiques dans votre maison
62935	CE 39	**Buying a Toilet** Advice and tips on what to look for when buying a toilet. Aussi disponible en français sous le titre : L'achat de toilettes
63319	CE 40	**Buying a House with a Well and Septic System** Information on what to inspect and test if a property has a well and/or septic system. Includes checklists for potential buyers. Aussi disponible en français sous le titre : L'achat d'une maison avec un puits et une installation septique
62953	CE 41A	**UV Water Treatment** Describes the ultra-violet light water treatment process, and the pros and cons of using such a system. Aussi disponible en français sous le titre : Traitement de l'eau aux rayons ultraviolets (UV)
62898	CE 41B	**Water Distillers** Everything you ever wanted to know about water distillers from how they work to how to install and maintain them. Aussi disponible en français sous le titre : La distillation de l'eau

Order no.	Series no.	Title
62896	CE41C	**Water Filters** Consumer series of household water treatment options. Water filters are an inexpensive method of additional water treatment. Some filters can remove certain contaminants such as lead. Aussi disponible en français sous le titre : Filtres à eau
62946	CE 41D	**Water Softeners** Find out how a water softener works and obtain information on whether you should consider installing one. Aussi disponible en français sous le titre : Les adoucisseurs d'eau
62962	CE 41E	**Reverse Osmosis Water Treatment** Describes the reverse osmosis water treatment process, and provides the pros and cons of using such a system. Aussi disponible en français sous le titre : Filtration de l'eau par osmose inverse
62966	CE 42	**Canada's Construction System** The purpose of this document is to foster understanding of the elements of the system of construction and operation of buildings and houses in Canada. Aussi disponible en français sous le titre : Système de construction canadien
63890	CE 43	**Photovoltaics (PVs)** Consumer information piece presenting information on solar electric (photovoltaic) systems for housing Aussi disponible en français sous le titre : Les systèmes photovoltaïques
63134	CE 44	**Painting: Walls, Ceilings and Floors** This fact sheet provides general information on: selecting paints, e.g. latex (water based) or alkyd (oil based); types of paint and paint finishes, e.g. low or high sheen, sealer, primer, melamine; estimating quantity of paint required; preparing for painting; and painting tips. Aussi disponible en français sous le titre : La peinture : murs, plafonds et planchers.
63144	CE 45	**Flooring Choices** A quick summary of the advantages, considerations, installation, maintenance, and costs to think about when choosing resilient, laminate, and wood flooring, as well as carpet and ceramic tile. Aussi disponible en français sous le titre : Les revêtements de sol

Order no.	Series no.	Title
63349	CE 46	**Fighting Asthma in Your House** Practical tips to help people with asthma improve the indoor air quality of their home. Aussi disponible en français sous le titre : Combattre l'asthme à la maison
63218	CE47	**Home Maintenance Schedule** This fact sheet provides a listing of the regular home maintenance tasks which should be done at various times throughout the year to protect the condition of your house. Aussi disponible en français sous le titre : Calendrier d'entretien de votre maison
63227	CE48	**Replacing Your Furnace** This fact sheet provides information for consumers who are replacing their existing furnace with a new one. It deals with fuel choice, furnace selection, and furnace sizing. Aussi disponible en français sous le titre : Le remplacement d'un générateur de chaleur
63235	CE 49	**Getting Your House Ready to Sell** Tips for homeowners who wish to get their house ready to sell. Aussi disponible en français sous le titre : Ce qu'il faut faire avant de mettre votre maison en vente
63436	CE50	**Avoiding Basement Flooding** Basement flooding leads to damage of the finishing material and possible growth of mold. This document reviews why basements flood and how to prevent floods from occurring. Aussi disponible en français sous le titre : Comment prévenir les inondations de sous-sol
63486	CE51	**Get to Know Your Soil** This fact sheet provides practical tips on how to analyse soil so that you can select the plants that are suited to the soil you have on your property. Once you have determined the soil conditions, it provides tips on how to amend it, if needed. Aussi disponible en français sous le titre : Apprenez à connaître votre sol
63488	CE52	**Low-Maintenance Lawns** Low-maintenance lawns help to reduce the time, costs, water, pesticides, fertilizer and energy used to maintain lawns. This fact sheet describes the benefits and provides practical tips on how to install and maintain low maintenance lawns, including species selection. Aussi disponible en français sous le titre : Les pelouses à faible entretien

Order no.	Series no.	Title
63490	CE53	**Rain Gardens: Improve Stormwater Management in Your Yard** Rain gardens are landscaped areas designed to receive stormwater and allow it to infiltrate into the soil. This fact sheet describes the benefits and provides practical tips on how to install and maintain gardens. Aussi disponible en français sous le titre : Un jardin pluvial pour mieux gérer les eaux de ruissellement dans votre cour
63492	CE54	**Understanding Your New Home Sales Contract** This fact sheet provides information on some of the terms and provisions that you may find in a new home sales agreement to illustrate what a contract can cover and an explanation why. Aussi disponible en français sous le titre : Comprendre le contrat de vente de votre maison neuve
63495	CE55	**Selecting A New Home Builder** This fact sheet provides information on how to find and what to look for and consider when searching for the right builder to build your new home. Aussi disponible en français sous le titre : Le choix d'un constructeur d'habitations
63637	CE56	**Preventing Falls on Stairs** This fact sheet tells you about some of the ways you can reduce the risk of falling on or from residential stairs. Aussi disponible en français sous le titre : Comment prévenir les chutes dans les escaliers
63730	CE57	**Efficient, Convenient Wood Heating** This is a short guide to the proper use of woodburning appliances in homes: what appliances to choose, how to operate them efficiently, what wood to burn, how to cut and store it, etc. Aussi disponible en français sous le titre : Le chauffage au bois pratique et efficace
63683	CE58	**The ABC's of Windows** This document will help consumers understand and select window performance levels with respect to airtightness, rain penetration and wind resistance appropriate for their climatic (and geographical) location and exposure conditions. Aussi disponible en français sous le titre : L'ABC des fenêtres

Order no.	Series no.	Title
63911	CE59	**Should You Test the Air in Your Home for Mold?** Testing the air in their home or apartment for mold is usually the first thing many people ask for when they suspect the presence of mold or have discovered mold growth. This fact sheet explains why air testing is not recommended, why an investigation by a trained professional is more useful and what to do if testing is deemed necessary. Aussi disponible en français sous le titre : Faut-il faire analyser l'air de la maison pour déceler la présence de moisissures?
63822	CE60	**What to Do After a Fire** Protect your health and prevent further damage to your home by following this detailed guide on the steps to restore your home after a fire. Aussi disponible en français sous le titre : Que faire après un incendie
64092	CE61	**Renovating Your Basement for Livability** This About Your House describes how renovating a full-height basement can be a relatively easy and cost-effective way to add new living space to your house. Aussi disponible en français sous le titre : Rénovation du sous-sol - objectif d'habitabilité
64064	CE62	**Lead in Older Homes** This About Your House describes where lead is found in older homes and who is at risk to lead exposure. It also describes procedures for testing lead in soil, water, paint, and dust. Aussi disponible en français sous le titre : Le plomb dans les vieilles maisons
65023	CE63a	**Accessible Housing by Design - Ramps (Large Print)** For anyone who needs to make their house accessible to someone who uses a wheelchair or other mobility device, this About Your House sheds light on the design and construction of ramps for the home. After reading this publication, you will understand how a ramp should be built, the materials that should be used and things to take into consideration before building a ramp for your home. Aussi disponible en français sous le titre : Une habitation accessible dès la conception - Les rampes d'accès (à gros caractères)

Order no.	Series no.	Title
65080	CE63b	**Accessible Housing by Design - Appliances (Large Print)** The design of an appliance can make it very easy or very difficult to use. If you have a disability, limitations in an appliance's design can make it almost impossible to use. Using the principles of Universal Design, this About Your House will help you select an appliance by outlining important design considerations, making helpful suggestions and explaining the safety features of appliances. Aussi disponible en français sous le titre : Une habitation accessible dès la conception — les appareils (à gros caractères)
65542	CE63c	**Accessible Housing by Design - Lifts & Residential Elevators** Residential lifts and elevators can benefit many people— particularly seniors who want to remain in their homes despite a loss of mobility, strength or agility. This About Your House tells you about the types of residential lifts and elevators that are commonly available in Canada. It also tells you about some of the things you should consider when you choose and install an elevator or lift in your home. Aussi disponible en français sous le titre : Une habitation accessible dès la conception - élévateurs et ascenseurs résidentiels
65544	CE63d	**Accessible Housing by Design - Residential Hoists and Ceiling Lifts** A residential hoist or ceiling lift can help people who have difficulty safely moving themselves or others in or out of bed, or in or out of a bathtub. This About Your House tells you about the types of residential hoists and ceiling lifts that are commonly available in Canada. It also tells you about some of the issues you should consider when you choose and install a hoist or ceiling lift in a house, condominium or apartment. Aussi disponible en français sous le titre : Une habitation accessible dès la conception - les lève-personnes résidentiels
65588	CE63e	**Accessible Housing by Design - Kitchens** A home designed and constructed to reflect the principles of Universal Design is safer and more accommodating to the diverse range of ages and abilities of people who live in and visit this home. This About Your House discusses the Universal Design kitchen, which considers efficient design, efficiency of effort, adaptability, ease of cleaning, audibility and safety in order to provide a comfortable and safe space for all family members. Aussi disponible en français sous le titre : Une habitation accessible dès la conception - les cuisines

Order no.	Series no.	Title
65686	CE63f	**Accessible Housing by Design: Bathrooms** A bathroom designed and constructed according to the principles of universal design should be comfortable and safe for all family members, regardless of age or ability. This About Your House outlines the design considerations and elements of a universally designed bathroom, from manoeuvring space and ease of cleaning to grab bars and walk-in bathtubs and showers. Aussi disponible en français sous le titre : Une habitation accessible dès la conception - salle de bains
65889	CE63g	**Accessible Housing by Design: Home Automation** The use of technology and automation in the home can help create living spaces that are convenient and energy efficient, that minimize the potential for accidents, and result in a house that is able to adapt to life's changes. Home automation provides many benefits to people with physical, sensory and mental disabilities, allowing them to live more independently. This AYH describes systems and devices that can control elements of your home environment . lighting, appliances, telephones, home security and mechanical, entry and safety systems . resulting in an environment that is more accommodating to everyone who lives there or visits, regardless of age or physical ability. Aussi disponible en français sous le titre : Une habitation accessible dès la conception - Domotique
66091	CE63h	**Accessible Housing by Design: Fire Safety for You and Your Home** People with disabilities and seniors are more likely to be injured in a fire than the general population as they are often unable to evacuate independently and quickly, and are not prepared with a fire safety plan. This About Your House provides many quick and easy steps that you can take to prevent fires in your home and plan for fire and emergency situations and minimize accidents ensuring that your home occupants, especially people with disabilities and seniors family are safe. Aussi disponible en français sous le titre : Une habitation accessible dès la conception - la sécurité-incendie pour assurer votre protection et celle de votre habitation
66348	CE64	**How to Get the Ventilation That You Need in Your House** This document provides a guide to using the ventilation systems in your house to provide adequate fresh air to residents. Aussi disponible en français sous le titre : Comment bien ventiler votre maison

Order no.	Series no.	Title
65009	CE65	**Garden Suites** With municipal approval, a garden suite is a self-contained unit, set on relative's property with an existing single family house. This publication provides introductory information on garden suites for seniors or persons with disabilities. Aussi disponible en français sous le titre : Les pavillons-jardins
65527	CE66A	**How to Lock Out Crime - Home Security 101** This fact sheet walks you through an assesment of your home's current security; includes a checklist that can help you assess what needs to be improved. Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile 101
65529	CE66B	**How to Lock Out Crime - Home Security - Exterior** This fact sheet gives you suggestions on how to improve security from the exterior of your home through lighting strategies and home visibility. Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - L'extérieur
65531	CE66C	**How to Lock Out Crime - Home Security—Alarms** This fact sheet gives you information to help you decide whether an installed burglar alarm is the right choice for you. Two types of systems are discussed, the perimeter alarm system and the area alarm system. Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - Les avertisseurs
65533	CE66D	**How to Lock Out Crime - Home Security - Doors** This fact sheet suggests ways you can improve your door security. Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - Les portes
65535	CE66E	**How to Lock Out Crime - Home Security - Windows** This fact sheet suggests ways to improve the security performance of your windows. Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - Les fenêtres
65537	CE66F	**How to Lock Out Crime - Home Security - Patio Doors** This fact sheet suggests ways to improve the security of one of the favourite targets of burglars: patio doors. Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - Les portes-fenêtres

ABOUT YOUR HOUSE SERIES

Order no.	Series no.	Title
65539	CE66G	**How to Lock Out Crime: Home Security -- Common Sense** Even if all the required bolts, hinges, latches and alarms have been installed, good home security cannot be achieved without first adopting the common-sense precautions outlined in this fact sheet. Aussi disponible en français sous le titre : Gare au crime - La sécurité à domicile - Une affaire de bon sens
66343	CE67	**Attached Garages and Indoor Air Quality** Attached garages, while convenient, can move vehicle-based pollutants into houses. The document shows how to avoid this source of pollution. Aussi disponible en français sous le titre : Les garages attenants et la qualité de l'air intérieur
66497	CE68	**Secondary Suites** Secondary suites can provide affordable living space and intensify urban development without adding new buildings. This article explains what the homeowner should consider before building or renovating a secondary suite. Aussi disponible en français sous le titre : **Appartements accessoires**
65548	CE70	**EQuilibrium: Healthy Housing for a Healthy Environment** CMHC's EQuilibrium housing initiative is a powerful new movement in sustainable housing. It can help homeowners reduce their energy bills, protect their families' health, reduce greenhouse gas emissions, and keep the environment clean for generations to come. Aussi disponible en français sous le titre : Equilibrium : maison saine pour un environnement sain

ABOUT YOUR APARTMENT SERIES

Order no.	Series no.	Title
63419	AE1	**Solving Odour Transfer Problems in Your Apartment** One of the most common problems experienced by the occupants of apartment buildings is the transfer of objectionable odours from one apartment to another. Tobacco smoke and cooking odours top the list of complaints. This fact sheet explains how odours are transferred, and offers a number of potential solutions. Some are very easy to implement and others should be done with the agreement of the building management. Some are trial and error. Solving the problem can take perseverance. Aussi disponible en français sous le titre : Enrayez la transmission d'odeurs dans votre appartement

Order no.	Series no.	Title
63904	AE2	**Reducing Noise in Your Apartment** This article provides basic information about the behaviour of sound and noise and suggests ways to improve the peace and tranquility in your apartment or condominium. Aussi disponible en français sous le titre : Atténuation du bruit dans votre appartement
65013	AE3	**Dealing with Power Outages** Lengthy power outages rarely occur in Canada, but when they do, they can affect your comfort and safety. This fact sheet, intended specifically for occupants of multi-unit residential buildings, will help you plan ahead for, and deal with, power outages in your apartment building. Topics include, amongst others, contents of an emergency kit, use of alternate power, and summer and winter power failures. Aussi disponible en français sous le titre : Les pannes de courant
65050	AE4	**Fire Safety** Each year, many Canadians are injured or die in house or apartment fires. This fact sheet, intended specifically for occupants of multi-unit residential buildings, offers practical fire prevention tips and important information regarding smoke alarms. It will also help you create an escape plan for you and your family, and instruct you on what to do should a fire occur in your apartment. Aussi disponible en français sous le titre : La sécurité-incendie
65041	AE5	**Improving Your Security and Safety** This About Your Apartment fact sheet, intended specifically for occupants of multi-unit residential buildings, provides practical advice on how to protect yourself, your family, and your belongings. It highlights the types of security and safety features you may have in your building and how to use them effectively. Topics include, amongst others, proper locks for windows and doors, neighbourhood security, preventing falls from windows and balconies, combustion safety, and carbon monoxide. Aussi disponible en français sous le titre : Pour une meilleure sécurité chez soi
65297	AE6	**Dealing with Pests** Most people can relate to the surprise, shock and revulsion of coming across pests in their homes. This fact sheet, intended specifically for occupants of multi-unit residential buildings, will help you prevent and reduce infestations in your apartment by describing how insects enter homes and what they need to survive. Topics include pest proofing your apartment, Integrated Pest Management (IPM), and health concerns associated with pests and pesticides. Aussi disponible en français sous le titre : La lutte contre les parasites

Order no.	Series no.	Title
66002	AE7	**The Tenant's Guide to Mold** This fact sheet is intended for people living in rented apartments and offers practical information on mold problems beginning with an overview of mold and its causes, why it is a concern, and how to identify a mold problem and estimate its severity. Aussi disponible en français sous le titre : Guide sur la moisissure à l'intention des locataires
65975	AE8	**Energy and Water Saving Tips for Your Apartment** This fact sheet has energy- and water-saving tips that can save you money and make your apartment more comfortable. It lists things you can do yourself and things you can do in co-operation with your building's management Aussi disponible en français sous le titre : Conseils pour économiser l'énergie et l'eau dans votre appartement

ABOUT YOUR HOUSE - **NORTH SERIES**

VOTRE MAISON - **DOSSIER DU NORD**

The North About Your House series is a series specifically designed around day to day northern solutions as well as innovative northern models of building practices which work under cold climate conditions. In this series you will find examples of how to use structural panels in the high arctic, means to cleanse waste-water in the North as well as demonstrated ways of constructing a roof which can withstand northern conditions and how to choose a foundation system which will work in any of the northern communities.

Order no.	Series no.	Title
62303	North Series 1	Building with Structural Panels -- Repulse Bay
62304	Dossier du Nord	Maison à panneaux isolants de construction à Repulse Bay
62295	North Series 2	On-site Wastewater Reclamation Systems for the North
62297	Dossier du Nord 2	Installations de recyclage sur place des eaux usées dans le nord
62329	North Series 3	Snowshoe Inn, Fort Providence Co-generation Model
62330	Dossier du Nord 3	Modèle de cogénération du Snowshoe Inn, Fort Providence
62298	North Series 4	Residential Foundation Systems for Permafrost Regions
62299	Dossier du Nord 4	Fondations pour les bâtiments résidentiels construits sur le pergélisol
62154	North Series 5	Eagle Lake Healthy House
62155	Dossier du Nord 5	La maison saine d'Eagle Lake
62313	North Series 6	Arctic Hot Roof Design
62314	Dossier du Nord 6	Conception de toits chauds pour climat arctique
63050	North Series 8	How to Prevent Plumbing and Heating Vent Stack Freeze-up
63051	Dossier du Nord 8	Prévenir le gel des colonnes de ventilation de plomberie et des conduits d'évacuation de l'appareil de chauffage
63394	North Series 9	Fancoil Integrated Combination Heat and Domestic Hot Water Systems
63395	Séries du Nord 9	Installation de chauffage des locaux et de l'eau intégrée à un ventilo-convecteur

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66569	09-107	Monitoring Results for the Factor 9 Home
66555	09-106	Effectiveness of Dehumidifiers in Controlling Moisture in Houses
66564	09-105	Understanding Vapour Permeance and Condensation in Wall Assemblies
66541	09-104	The Northern Sustainable House: An Innovative Design Process
66474	09-103	Canada at the 2007 Solar Decathlon Competition
66476	09-102	Code Requirements and Costs of Incorporating Accessory Apartments in Houses
66373	09-101	Seabird Island Monitoring
66333	09-100	Long Term Performance of Slab-on-Grade House Foundations in Regina, Saskatchewan
66135	08-107	Effect of Mesh and Bale Orientation on the Strength of Straw Bale Walls
66097	08-106	Analysis of Renewable Energy Potential in the Residential Sector through High-Resolution Building-Energy Simulation
66063	08-105	Fixing Houses with High Radon -A Canadian Demonstration
66060	08-104	Approaching Net-Zero Energy in Existing Housing
65961	08-103	Laboratory Depressurization Test for Residential Gas Appliances - Part 2
65916	08-102	Development and Assessment of Crawl Space Remediation Strategies
65830	08-101	Benchmarking Home Energy Savings from Energy-Efficient Lighting
65903	08-100	Assessment of Natural Ventilation for Canadian Residential Buildings
65861	07-124	Residential Solar Mass Wall Analysis for Canada
65843	07-123	Understanding Vapour Permeance and Condensation in Wall Assemblies
65828	07-122	Straw Bale Construction in Atlantic Canada
65834	07-120	The Effects of Programmable Fan Conrollers on Ventilation, Air Distribution and Energy Use

Order no.	Series no.	TITLE
65863	07-119	Monitored Thermal Performance of ICF Walls in MURBs
65891	07-118	Preserved Wood as a Potential Source of Arsenic and Fungi in the Foundation Walls of Homes
65684	07-117	Investigation of the Performance of Residential Electronic Filters in Actual Use
65680	07-116	Drainwater Heat Recovery Performance Testing at CCHT
65649	07-115	Whistle Bend Planning and Design Charrette
65546	07-114	Wind-Rain Relationships in Southwestern British Columbia
65322	07-113	Sustainable Northern Development Charrette in Yellowknife
65302	07-112	Research on Green Rooftops and Walls in Québec City
65417	07-111	Field Testing of Valved Soffit Vent Performance in Protecting Roof and Attic in Strong Winds
65378	07-110	Action Plan for Sustainable Practices - Implementation Strategies for the Residential and Business Sections in the Greater Toronto Area
65365	07-109	Testing Oil-fired Appliance Depressurization Spillage
65352	07-108	Boiler Piping Study
65350	07-107	Southeast False Creek Integrated Design Process Workshops
65375	07-106	Evaluation of Water-Efficient Toilet Technologies to Carry Waste in Drainlines
65033	07-105	Performance Evaluation of Retrofitted Solid Masonry Exterior Walls
65421	07-104	High-Performance Stucco for Housing
65346	07-103	Economic Assessment of Residential Basement System Insulation Options
65295	07-102	The Effects of Reflective Interior Shades on Cooling Energy Consumption at the CCHT Research Facility
65336	07-101	A Discussion Paper: Indoor Air Quality Investigations of Houses used for Marijuana Grow Operations
65344	07-100	Relationship Between Moisture Content and Mechanical Properties of Gypsum Sheathing
65104	06-114	Old North End, Saint John, New Brunswick Community Planning and Housing Charrette
65187	06-113	Green Roofs: A Resource Manual for Municipal Policy Makers

Order no.	Series no.	TITLE
65100	06-112	Arviat Community and Housing Design Charrette
65259	06-111	Validation of an Onsite Wastewater Risk Assessment Model
65257	06-110	Impact of Water Softeners on Septic Tanks - Field Evaluation Study
65092	06-109	Occupancy-based Classification System for Design and Construction of Residential Basements
65243	06-108	Field Assessment of a NuAir AIMS eKOCOMFORT™ Unit
65245	06-107	The eKOCOMFORT Field Assessment Program
65274	06-106	West Coast Green Roof Performance at BCIT's Green Roof Research Facility
65035	06-104	Household Environmental Monitoring - A Strategy to Help Homeowners Reduce Their Environmental Impact
64994	06-103	Identifying and Removing Pollutants from Heat Recovery Ventilators
65002	06-102	Evaluation of Air Leakage Control Measures to Compartmentalize Newly Constructed Suites in a High- Rise Residential Building
64934	06-101	Green Phoenix Integrated Design Charrette for Sustainable Affordable Housing
64958	06-100	Performance Evaluation of the Almon Street Multi-Unit Residential Building
64942	05-120	Investigating Moisture in Seasonal Housing
64940	05-119	Energy and Water Consumption Load Profiles in Multi-Unit Residential Buildings
64911	05-117	Predicting Time to Fogging of Insulated Glass Units
64913	05-116	Nunavut Research 2003-2005
64908	05-115	Study of Poured-in Place Concrete Wall Assemblies in Coastal British Columbia
64855	05-114	Reduction of Airborne Particles in Houses with Occupants Having Respiratory Ailments
64904	05-113	Duct Leakage Tests in Small Diameter Ducting System
64853	05-112	Assessment of Suite Compartmentalization and Depressurization in New High-rise Residential Buildings
64806	05-111	Laboratory Depressurization Test for Residential Gas Appliances
64843	05-110	Remote Monitoring and Control of On-site Wastewater Treatment, Recycling, and Reuse Systems

Order no.	Series no.	TITLE
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63945	05-107	Fire Experience, Smoke Alarms and Sprinklers in Canadian Homes: CMHC Research to 2005
63669	05-106	"The Land We Live on is our Home" The 'Gameti Ko' Project Second Community-led Workshop
63876	05-105	Testing the Adhesion of Air- Barrier Membranes in Wall Assemblies
63848	05-104	Ice Damming Field Research
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63838	05-102	Development of Micro-CHP Technology Assessment Capability at CCHT
63818	05-101	Effects of ECPM Furnace Motors on Electricity and Gas Use
63816	05-100	Effects of Thermostat Setting on Energy Consumption
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63741	04-130	Dry and Comfortable Floors in Existing Basements
63733	04-128	Dynamic Buffer Zone (DBZ) System Performance
63728	04-127	Comparison of Under-Floor Insulation Systems
63726	04-126	Update of Roof Truss Designs with Nailing Schedules
63641	04-125	Residential Sources of Lead
63677	04-124	Summary of Research on Water Resistive Barriers
63675	04-123	Assessing the Impact of Thickness on the Performance of Stucco Cladding
63673	04-122	Comparison and Analysis of Provincial Builder and Renovator Industry Programs
63635	04-121	Field Testing of "Spillage- Resistant" Appliances
63465	04-119	Diagnosing Attic Performance by Snow- and Frost-Melt Patterns
63620	04-118	Performance of Sprayed Polyurethane Foam on Indoor Foundation Walls
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63612	04-116	Energy Needs and Availability in Housing
63571	04-115	Building Canada: Phase One

Order no.	Series no.	TITLE
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63557	04-113	Installation Guide for Residential Wood I-Joist Floor Systems
63547	04-112	Canadian Home Inspectors and Building Officials National Initiative Phase II: Development of National Certification and Accreditation Models
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63540	04-110	Strategies for Reducing Building Energy Use Via Innovative Building Envelope Technologies
63511	04-109	Maximum Performance Testing of Popular Water-Efficient Toilet Models
63542	04-108	Garage Performance Testing
63503	04-107	Survey of In-Suite Space and Domestic Hot Water Heating Systems In Multi-Residential Buildings
63400	04-105	Field Testing of an Integrated Ventilation Space Conditioning System for Apartments
63413	04-104	Practical Measures for the Prevention of Basement Flooding Due to Municipal Sewer Surcharge
63407	04-103	House Dust: A Useful Tool To Assess Microbial Contamination In Homes
63390	04-102	Calgary Integrated Design and Sustainable, Affordable Housing Charrette
63365	04-101	Residential Combustion Spillage Monitoring
63376	04-100	Improved Make-up Air Supply Techniques
63382	03-134	Safe Housing for Lightly Contaminated Lands
63370	03-133	Residential Combustion Venting Failure - A Systems Approach
63374	03-131	The Canadian Residential Duct and Chimney Survey
63326	03-129	Monitoring the Performance of a Retrofitted Preserved Wood Foundation
63333	03-128	Review of Hygrothermal Models for Building Envelope Retrofit Analysis
63328	03-127	Static and Dynamic Earthquake Testing of Rainscreen Stucco Systems for B.C. Residential Wood-Frame Construction

Order no.	Series no.	TITLE
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63315	03-123	Integrated Community Solutions: Regina's Affordable, Sustainable Housing Design Charrette
63294	03-122	The Impact of Requiring HVAC System Design Submittal on System Performance
63280	03-121	Ventilation Systems for Multi-Unit Residential Buildings: Performance Requirements and Alternative Approaches
63243	03-119	Reduction of Air Intake Contamination in High-Rise Residential Buildings
63257	03-118	Investigation of a Ground-Source Heat Pump Retrofit to an Electrically Heated Multi-Family Building
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63208	03-114	Technology Roadmap for Intelligent Buildings
63223	03-113	Dawson City Demonstration Monitoring Northern Ventilation
63206	03-112	Guidelines for On-Site Measurement of Moisture in Wood Building Materials
63204	03-111	Comparison of Modeled and Monitored Performance of a Wall Insulation Retrofit in a Solid Masonry Building
63214	03-110	Integrated Design Charrette for a Sustainable UniverCity Community
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63188	03-108	Re-Sale of Leaky Condos: Did the Buyer Know?
63194	03-107	Design of Durable Joints Between Windows and Walls
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63190	03-105	Penetration of Outdoor Particles Into a Residence
63186	03-104	Indoor Particulate and Floor Cleaning
63182	03-103	Incompatible Building Materials
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63102	02-137	Multi-Residential High Efficiency Clothes Washer Pilot Project
63065	02-135	Monitored Performance of an Innovative Multi-Unit Residential Building
62637	02-133	Positive Pressure Ventilation for High-Rise Buildings
63035	02-132	Alternative Wall Systems for Low-Rise Housing
63053	02-130	Evaluation of Vapour Diffusion Ports on Drying of Wood-Frame Walls Under Controlled Conditions
63044	02-129	Investigation Protocol for Evaluation of Post-Tensioned Buildings
63019	02-128	"Northern Landscaping: A Guide to Restoring Plants and Soil in Northern Communities"
63015	02-127	LeBreton Flats District Heating System Performance Assessment
63017	02-125	Healthy Indoors: Achieving Healthy Indoor Environments in Canada
62995	02-124	Dual-Flush Toilet Testing
62997	02-123	Green Roof Infrastructure Workshop
63022	02-120	Study of High-Rise Envelope Performance in the Coastal Climate of British Columbia
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63104	02-117	Research Project on the Noise Produced by DWV Pipes Made of Cast Iron, PVC and ABS
62894	02-116	Wood Usage in Straw Bale House Construction
62892	02-115	Energy Use in Straw Bale Houses
62890	02-114	Defining the Convective Driving Force for Soil Gas Intrusion into Houses
63116	02-112	Community Energy Management – Foundation Paper
62881	02-109	Composite Masonry Wall Ties
62888	02-108	Noise Isolation Provided by Gypsum Board Partitions
62955	02-105	Achieving Healthy Indoor Environments: A Review of Canadian Options

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62968	02-102	Transforming Your Practice: Integrated Design Charrettes for Sustainable Buildings
62876	02-101	Healthy High-Rise: A Guide to Innovation in the Design and Construction of High-rise Residential Buildings
62960	02-100	Final Assessment of Conservation Co-op's Greywater System
62747	01-142	Analysis of the Annual Energy and Water Consumption of Apartment Buildings in the CMHC HiSTAR database
62745	01-141	The Sustainable Home Water System
62743	01-140	2001 Building Failures Study
62741	01-139	The Envelope Drying Rates Analysis Study
62739	01-138	Innovative On-Site Wastewater Treatment
62737	01-137	Evaluation of Urban Drainage for Basement Flood Proofing
62735	01-136	Protection of Basements Against Flooding Trends and Impacts of Drainage Regulations
62731	01-134	Technical Impediments to Use of the Existing On-Site Sewage System of Host House to Service Garden Suite on Same Property
62729	01-133	Lower Cost Alternative for Municipal Sewer Inspection and Maintenance
62727	01-132	Assessment of the Takla Landing Contour Trench Wastewater Disposal System
62723	01-130	The Ontario Wall Drying Project Phase 2
62721	01-129	The Ontario Wall Drying Project (1991)
62715	01-126	Monitoring of Cavity Humidity Levels at Canada Life Building
62713	01-125	A Commissionable Air Barrier System for the Building Envelope
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62707	01-122	Air Infiltration from Attached Garages in Canadian Houses
62705	01-121	Canadian Municipal Water Conservation Initiatives

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62699	01-118	Quality Assurance Protocol Test Drive by CMHC and Polygon Construction Management Ltd
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62693	01-115	Commissioning Guide for the Toronto Healthy Houses Water Systems
62691	01-114	Peak-Day Irrigation Demand Reduction Monitoring
62689	01-113	Evaluating the Performance of On-Site Sewage Disposal Systems
62687	01-112	Advancing the "Light Grey Option": Making Residential Greywater Use Happen
62685	01-111	Estimation of the Contribution of Phosphorus From On-Site Sewage Disposal Systems to Lakes
62679	01-108	Domestic Cold Water Booster Pump Control Monitoring Pilot Program
62677	01-107	Impact of Added Insulation on Air Leakage Patterns
62675	01-106	Thermostat Settings in Houses with In-floor Heating
62673	01-105	Case Study on Basement Renovations
62671	01-104	Monitoring the Performance of an EIFS Retrofit on a 15-Storey Apartment Building
62669	01-103	Energy Use Patterns in Off-Grid Houses
62667	01-102	"Plex" Housing: A Renewed Tradition
62663	01-100	WATERSAVE: Water Reclamation System Design Tool

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66560	09-016	2006 Census Housing Series: Issue 4 — Growth in Household Incomes and Shelter Costs, 1991-2006
66539	09-015	PerthWorks — A Small Town Sustainable Neighbourhood Project
66553	09-014	2001 Participation and Activity Limitation Survey: Issue 1 — Profile of the Housing Conditions of Canadians Aged 15 Years and Older with a Mobility and/or an Agility Disability
66472	09-013	Impact of Economic Cycles on the Incidence of Core Housing Need in Canada
66464	09-012	Housing Persons With an Intellectual Disability in Intentional Communities: Identifying Relevant Physical and Governance Structures
66422	09-011	Preconditions Leading to Market Housing on Reserve
66401	09-009	Government-imposed Charges On New Housing In Canada
66389	09-008	Affordability Challenges and Rental Market Dynamics in Small Nova Scotia Communities with Community College Campuses
66303	09-007	2001 Census Housing Series: Issue 14 Household Mobility and Core Housing Need
66383	09-006	2006 Census Housing Series Issue 3 — The Adequacy, Suitability, and Affordability of Canadian Housing, 1991 - 2006
66360	09-005	2006 Census Housing Series Issue 2: the Geography of Core Housing Need, 2001 - 2006
66381	09-003	Affordability Trends 1981–2001: An Analysis of Selected Metropolitan Regions in Canada
66387	09-002	Settling In: Newcomers in the Canadian Housing Market, 2001–2005
66391	09-001	Low-Income Urban Households Not in Core Housing Need
66337	08-020	Breaking Ground: A Fused Grid Neighbourhood in Calgary
66279	08-018	2001 Census Housing Series Issue 13: Housing Conditions of Women and Girls
66206	08-017	Adapting Your Home to Living with Dementia

RESEARCH HIGHLIGHTS: SOCIO-ECONOMIC SERIES

Order no.	Series no.	TITLE
66141	08-016	2001 Census Housing Series: Issue 12 – Housing Conditions of Visible Minority Households in Canada
66139	08-015	City of Dryden-Sustainable Waterfront Development Plan
66099	08-014	Community Indicators for an Aging Population
66086	08-013	Giving Pedestrians an Edge—Using Street Layout to Influence Transportation Choice
66071	08-012	Taming the Flow — Better Traffic and Safer Neighbourhoods
65959	08-011	Understanding the Status of Visitability in Canada
65674	08-010	Neighbourhood Effects and Concentration Levels of Aboriginal People in Large Canadian Cities
66004	08-009	Adapting Homes to Extend Independence - Case Study of 13 Frail Seniors in Quebec City Suburbs
65935	08-008	The Role of Housing in Aboriginal Student Success - Post-Secondary Institutions in Vancouver
65590	08-006	Feasibility of Risk Management as a Subject for Capacity Building in First Nations Communities
65845	08-004	2006 Census Housing Series Issue 1: Demographics and Housing Construction
65913	08-003	Impacts of the Aging of the Canadian Population on Housing and Communities
65901	08-002	The Dynamics of Housing Affordability
65933	08-001	Life Cycle Costing Tool for Community Infrastructure Planning
65836	07-022	2001 Census Housing Series Issue 11: Profile of the Housing Conditions of Persons with Disabilities
65682	07-018	Housing Situation and Needs of Recent Immigrants in Montreal, Toronto, and Vancouver
65672	07-017	Supportive Housing for Homeless and Hard-to-House Seniors: An In-Depth Case Study
65670	07-016	How Effective Are Bathtub Grab Bars for Stopping a Fall When You Loose Your Balance?
65660	07-015	The Old Grace Hospital Site Charrette
65658	07-013	A Plan for Rainy Days: Water Runoff and Site Planning
65560	07-011	Growth Management and Affordable Housing in Greater Toronto
65553	07-010	Housing Issues Facing Seasonal Workers

Order no.	Series no.	TITLE
65550	07-009	Fire Prevention in Aboriginal Communities Manual and DVD
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